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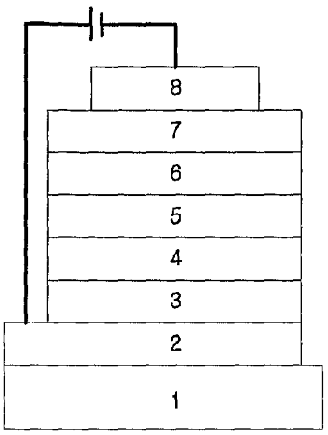
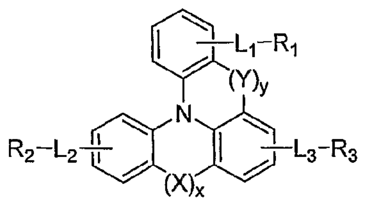
[Continued on next page]

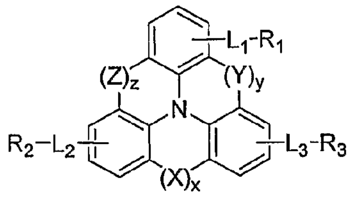
(54) Title: NOVEL COMPOUNDS FOR ORGANIC ELECTRONIC MATERIAL AND ORGANIC ELECTRONIC DEVICE USING THE SAME

【Figure 1】





(I)



(II)

(57) Abstract: Provided are novel compounds for organic electronic material, and organic electronic devices comprising the same. Specifically, the compounds for organic electronic material according to the invention are characterized in that they are represented by Chemical Formula (I) or Formula (II): wherein, R_1, R_2 and R_3 cannot be hydrogen all at the same time; excluding the case wherein R_1-L_1-{ , R_2-L_2 -{ or R_3-L_3-{ independently represents diphenylamino group({ -NPh_2).

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【DESCRIPTION】

【Invention Title】

NOVEL COMPOUNDS FOR ORGANIC ELECTRONIC MATERIAL AND ORGANIC ELECTRONIC DEVICE USING THE SAME

【Technical Field】

<1> The present invention relates to novel compounds for organic electronic material, and organic electronic devices comprising the same. More specifically, the invention relates to novel compounds for organic electronic material having high efficiency, and organic electronic devices which comprises the compounds in a hole transport layer or a hole injecting layer, or in an electroluminescent layer as the host for phosphor.

【Background Art】

<2> Among display devices, electroluminescence devices (EL devices) are self-luminescent display devices showing the advantage of wide angle of view, excellent contrast and rapid response rate. Eastman Kodak developed in 1987 an organic EL device which employs a low molecular weight aromatic diamine and an aluminum complex as material for forming an EL layer, for the first time [Appl. Phys. Lett. 51, 913, 1987].

<3> An organic EL device is a device wherein, when charge is applied to an organic film formed between an electron injection electrode (cathode) and a hole injection electrode (anode), an electron and a hole form a pair and then become extinct with emitting light. A device can be formed on a transparent flexible substrate such as plastics. The device can be operated at a lower voltage (not more than 10 V) with relatively lower power consumption but excellent color purity, as compared to a plasma display panel or an inorganic EL display.

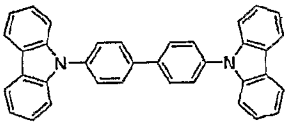
<4> The most important factor to determine the performances such as luminous efficiency, lifetime or the like in an organic EL device is electroluminescent material. Several properties required for such electroluminescent materials include that the material should have high fluorescent quantum yield in solid state and high mobility of electrons and

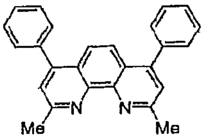
holes, is not easily decomposed during vapor-deposition in vacuo, and forms uniform and stable thin film.

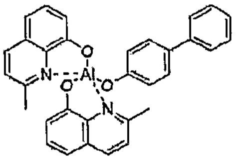
<5> Organic electroluminescent materials can be generally classified into high-molecular materials and low-molecular materials. The low-molecular materials include metal complexes and thoroughly organic electroluminescent materials which do not contain metal, from the aspect of molecular structure. Such electroluminescent materials include chelate complexes such as tris(8-quinolinolato)aluminum complexes, coumarin derivatives, tetraphenylbutadiene derivatives, bis(styrylarylene) derivatives and oxadiazole derivatives. From those materials, it is reported that light emission of visible region from blue to red can be obtained

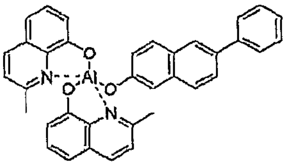
<6> Three electroluminescent materials (for red, green and blue) are employed to realize a full-colored OLED display. The important issue is to develop red, green and blue electroluminescent materials with high efficiency and long life, in order to enhance the overall feature of the organic electroluminescent (EL) devices. The EL materials are classified into host materials and dopant materials from the aspect of their functions. It is generally known that a device structure having the most excellent EL properties can be fabricated with an EL layer prepared by doping a dopant to a host. Recently, development of organic EL devices with high efficiency and long life comes to the fore as an urgent subject, and particularly urgent is development of a material with far better EL properties as compared to conventional EL materials as considering EL properties required for a medium to large sized OLED panel.

<7> As a host material for phosphorescent light emitting material, 4,4'-N,N'-dicarbazole-biphenyl (CBP) has been most widely known up to the present, and OLED's having high efficiency to which a hole blocking layer (such as BCP and BAlq) had been applied have been developed. Pioneer (Japan) or the like reported OLED's of high performances which were developed by using bis(2-methyl-8-quinolinato)(p-phenylphenolato)aluminum (III) (BAlq) derivatives as the host.


CBP


BCP


BAlq

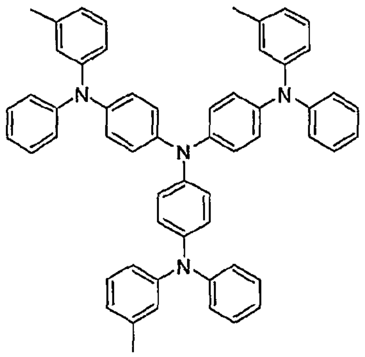

BAlq derivative

<8>

<9> Though the conventional materials are advantageous in view of light emitting property, they have low glass transition temperature and very poor thermal stability, so that the materials tend to be changed during high temperature vapor-deposition in vacuo. In an organic electroluminescent device (OLED), it is defined that power efficiency = (π/voltage) x current efficiency. Thus, the power efficiency is inversely proportional to the voltage, and the power efficiency should be higher in order to obtain lower power consumption of an OLED. In practice, an OLED employing phosphorescent electroluminescent (EL) material shows significantly higher current efficiency (cd/A) than an OLED employing fluorescent EL material. However, in case that a conventional material such as BAlq and CBP as host material of the phosphorescent EL material is employed, no significant advantage can be obtained in terms of power efficiency (lm/w) because of higher operating voltage as compared to an OLED employing a fluorescent material.

<10> Furthermore, there was no satisfactory result in view of life of an OLED, so that development of host material providing better stability and higher performance is still required.

<11> Further, hole injecting/transport materials including copper phthalocyanine (CuPc), 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl (NPB) and MTDATA have been known.



<12> MTDATA

<13> In view of improvement in durability of an organic electroluminescent device, it is reported that compounds having higher non-crystallinity give higher stability of thin film. Glass transition temperature (Tg) is employed as an index for non-crystallinity.

<14> It is recognized that conventional MTDATA does not show high non-crystallinity, having glass transition temperature of 76℃. Thus, no satisfactory property could be obtained in terms of durability of the organic EL device, or luminous efficiency which comes from the hole injecting/transport property.

【Disclosure】

【Technical Problem】

<15> Thus, the object of the invention is to provide organic novel compounds for organic electronic material having the backbone to give better luminous efficiency and device life with appropriate color coordinate as compared to those of conventional host material of phosphor, with overcoming disadvantages of them.

<16> Another object of the invention is to provide organic electronic device employing the novel compounds for organic electronic material in the hole injecting layer, the hole transport layer or the electroluminescent layer.

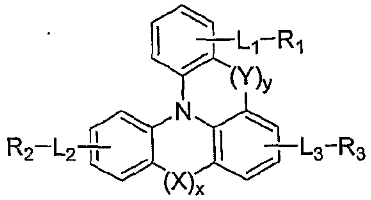
<17> Still another object of the invention is to provide organic solar cells comprising the novel compounds for organic electronic material.

【Technical Solution】

<18> The present invention relates to novel compounds for organic electronic

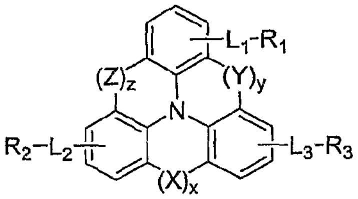
material, and organic electronic devices comprising the same. Specifically, the novel compounds for organic electronic material according to the invention are represented by Chemical Formula (1) or Chemical Formula (2):

<19> [Chemical Formula 1]



<20>

<21> [Chemical Formula 2]



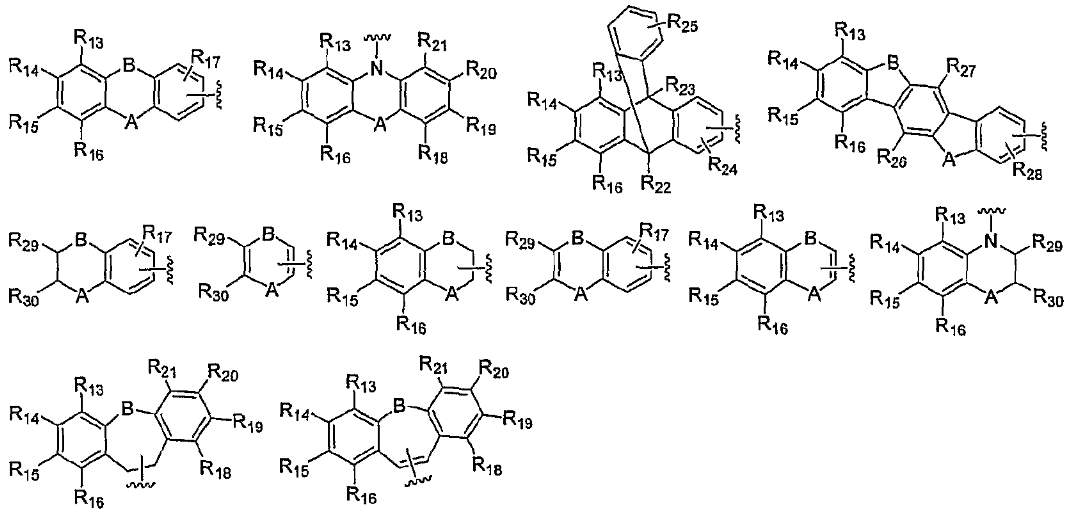
<22>

<23> wherein,

<24> L_1, L_2 and L_3 independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkylene, adamantylene, (C7-C60)bicycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C6-C60)ar(C1-C60)alkylene, (C1-C60)alkyenethio, (C1-C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

<25> R_1, R_2 and R_3 independently represent hydrogen, deuterium, (C6-C60)aryl, (C3-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, $NR_{11}R_{12}$, or a substituent selected from the following structures (excluding the case wherein R_1, R_2 and R_3 are hydrogen all at the same time):

<26>



<27> R_{11} and R_{12} independently represent (C6-C60)aryl or (C3-C60)heteroaryl, or may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<28> R_{13} through R_{30} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or each of R_{13} through R_{25} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<29> A, B, X, Y and Z independently represent a chemical bond, or $(CR_{31}R_{32})_a$-, $-N(R_{33})-$, -S-, -O-, $-Si(R_{34})(R_{35})-$, $-P(R_{36})-$, -C(=O)-, $-B(R_{37})-$, $-In(R_{38})-$, -Se-, $-Ge(R_{39})(R_{40})-$, $-Sn(R_{41})(R_{42})-$, $-Ga(R_{43})-$ or $(R_{44})C=C(R_{45})-$;

<30> R_{31} through R_{45} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R_{31} and R_{32}, R_{34} and R_{35}, R_{39} and R_{40}, R_{41} and R_{42}, or R_{44} and R_{45} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<31> the arylene, heteroarylene, arylenoxy or arylenethio of L_1, L_2 and L_3; the aryl or heteroaryl of R_1, R_2, R_3, R_{11} and R_{12}; or the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, bicycloalkyl, alkenyl, alkynyl, aralkyl, alkyloxy, alkylthio, aryloxy, arylthio, alkylamino, arylamino, alkoxycarbonyl, alkylcarbonyl or arylcarbonyl of R_{13} through R_{30} and R_{31} through R_{45} may be further substituted by one or more substituent(s) selected from a group consisting of deuterium, halogen, (C1-C60)alkyl with or without halogen substituent(s), (C6-C60)aryl, (C3-C60)heteroaryl with or without (C6-C60)aryl substituent(s), morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, carbazolyl, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyl(C6-C60)aryl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl; and

<32> a, x, y and z independently represent an integer from 0 to 4;

<33> but excluding the case wherein R_1-L_1-, R_2-L_2- or R_3-L_3- independently represents diphenylamino group (-NPh_2).

<34>

<35> The term "alkyl" and other substituents containing alkyl moiety includes linear and branched species.

<36> The term "aryl" described herein means an organic radical derived from aromatic hydrocarbon via elimination of one hydrogen atom. Each ring suitably comprises a monocyclic or fused ring system containing from 4 to 7, preferably from 5 to 6 cyclic atoms. Specific examples include phenyl, naphthyl, biphenyl, anthryl, indenyl, fluorenyl, phenanthryl, triphenylenyl, pyrenyl, perylenyl, chrysenyl, naphthacenyl and fluoranthenyl, but they are not restricted thereto.

<37> The term "heteroaryl" described herein means an aryl group containing from 1 to 4 heteroatom(s) selected from N, O and S for the aromatic cyclic backbone atoms, and carbon atom(s) for remaining aromatic cyclic backbone atoms. The heteroaryl may be 5- or 6-membered monocyclic heteroaryl or a polycyclic heteroaryl which is fused with one or more benzene ring(s), and may be partially saturated. The heteroaryl groups may include divalent aryl groups of which the heteroatoms are oxidized or quarternized to form N-oxides, quaternary salts, or the like. Specific examples include monocyclic heteroaryl groups such as furyl, thiophenyl, pyrrolyl, imidazolyl, pyrazolyl, thiazolyl, thiadiazolyl, isothiazolyl, isoxazolyl, oxazolyl, oxadiazolyl, triazinyl, tetrazinyl, triazolyl, tetrazolyl, furazanyl, pyridyl, pyrazinyl, pyrimidinyl, pyridazinyl; polycyclic heteroaryl groups such as benzofuranyl, benzothiophenyl, isobenzofuranyl, benzimidazolyl, benzothiazolyl, benzisothiazolyl, benzisoxazolyl, benzoxazolyl, isoindolyl, indolyl, indazolyl, benzothiadiazolyl, quinolyl, isoquinolyl, cinnolinyl, quinazolinyl, quinoxalinyl, carbazolyl, phenanthridinyl and benzodioxolyl; and corresponding N-oxides (for example, pyridyl N-oxide, quinolyl N-oxide)

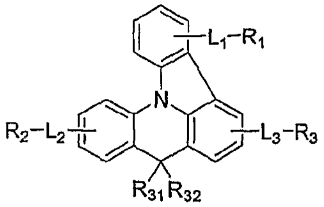
and quaternary salts thereof; but they are not restricted thereto.

<38> The substituents comprising "(C1-C60)alkyl" moiety described herein may contain 1 to 60 carbon atoms, 1 to 20 carbon atoms, or 1 to 10 carbon atoms. The substituents comprising "(C6-C60)aryl" moiety may contain 6 to 60 carbon atoms, 6 to 20 carbon atoms, or 6 to 12 carbon atoms. The substituents comprising "(C3-C60)heteroaryl" moiety may contain 3 to 60 carbon atoms, 4 to 20 carbon atoms, or 4 to 12 carbon atoms. The substituents comprising "(C3-C60)cycloalkyl" moiety may contain 3 to 60 carbon atoms, 3 to 20 carbon atoms, or 3 to 7 carbon atoms. The substituents comprising "(C2-C60)alkenyl or alkynyl" moiety may contain 2 to 60 carbon atoms, 2 to 20 carbon atoms, or 2 to 10 carbon atoms.

<39> In Chemical Formula (1) or (2), if R_1-L_1-, R_2-L_2- and R_3-L_3- independently represent diphenylamino group (-NPh_2) (in other word, if L_1, L_2 or L_3 represents chemical bonds, R_1, R_2 or R_3 represent $NR_{11}R_{12}$, and both R_{11} and R_{12} represent phenyl), at least one of phenyl must have a substituent other than hydrogen.

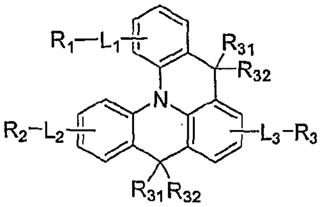
<40> The compounds for organic electronic material according to the invention can be selected from those represented by one of Chemical Formulas (3) to (6):

<41> [Chemical Formula 3]



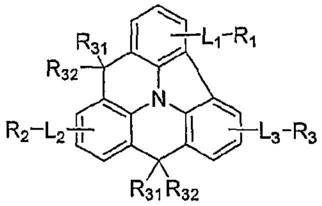
<42>

<43> [Chemical Formula 4]



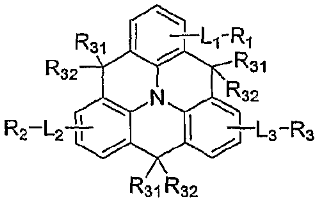
<44>

<45> [Chemical Formula 5]



<46>

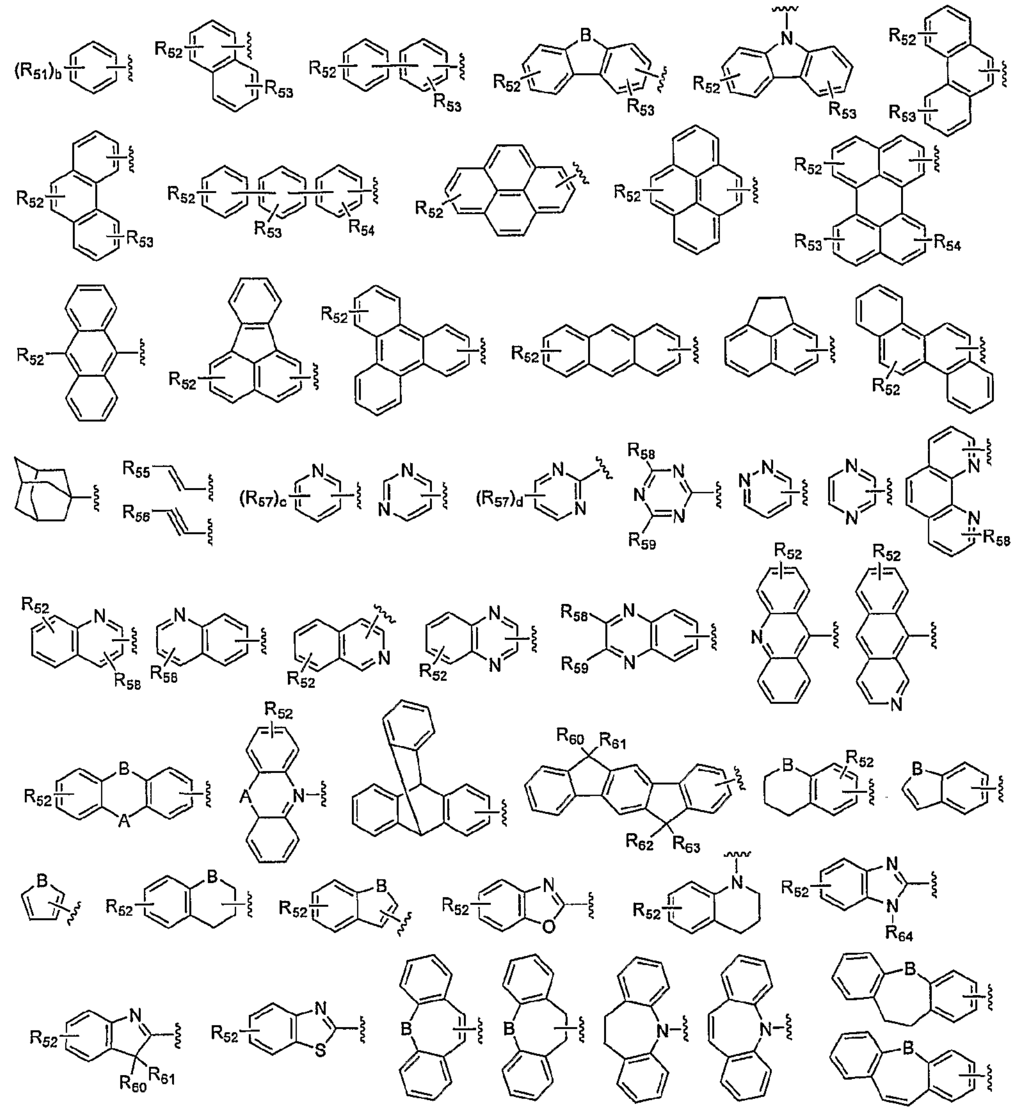
<47> [Chemical Formula 6]



<48>

<49> wherein, L_1, L_2, L_3, R_1, R_2, R_3, R_{31} and R_{32} are defined as in Chemical Formula (1) or (2).

<50> In the chemical formulas, R_1, R_2 and R_3 independently represent, without restriction, hydrogen, deuterium or $NR_{11}R_{12}$, or a substituent selected from the following structures:



<51>

<52> wherein, R_{11} and R_{12} are defined as in Chemical Formula (1) or (2);

<53> R_{51} through R_{64} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, halo(C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyl(C6-C60)aryl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl,

(C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl;

<54> A and B independently represent C(R_{31})(R_{32})-, -N(R_{33})-, -S-, -O-, -Si(R_{34})(R_{35})-, -P(R_{36})-, -C(=O)-, -B(R_{37})-, -In(R_{38})-, -Se-, -Ge(R_{39})(R_{40})-, -Sn(R_{41})(R_{42})-, -Ga(R_{43})- or (R_{44})C=C(R_{45})-;

<55> R_{31} through R_{45} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R_{31} and R_{32}, R_{34} and R_{35}, R_{39} and R_{40}, R_{41} and R_{42}, or R_{44} and R_{45} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

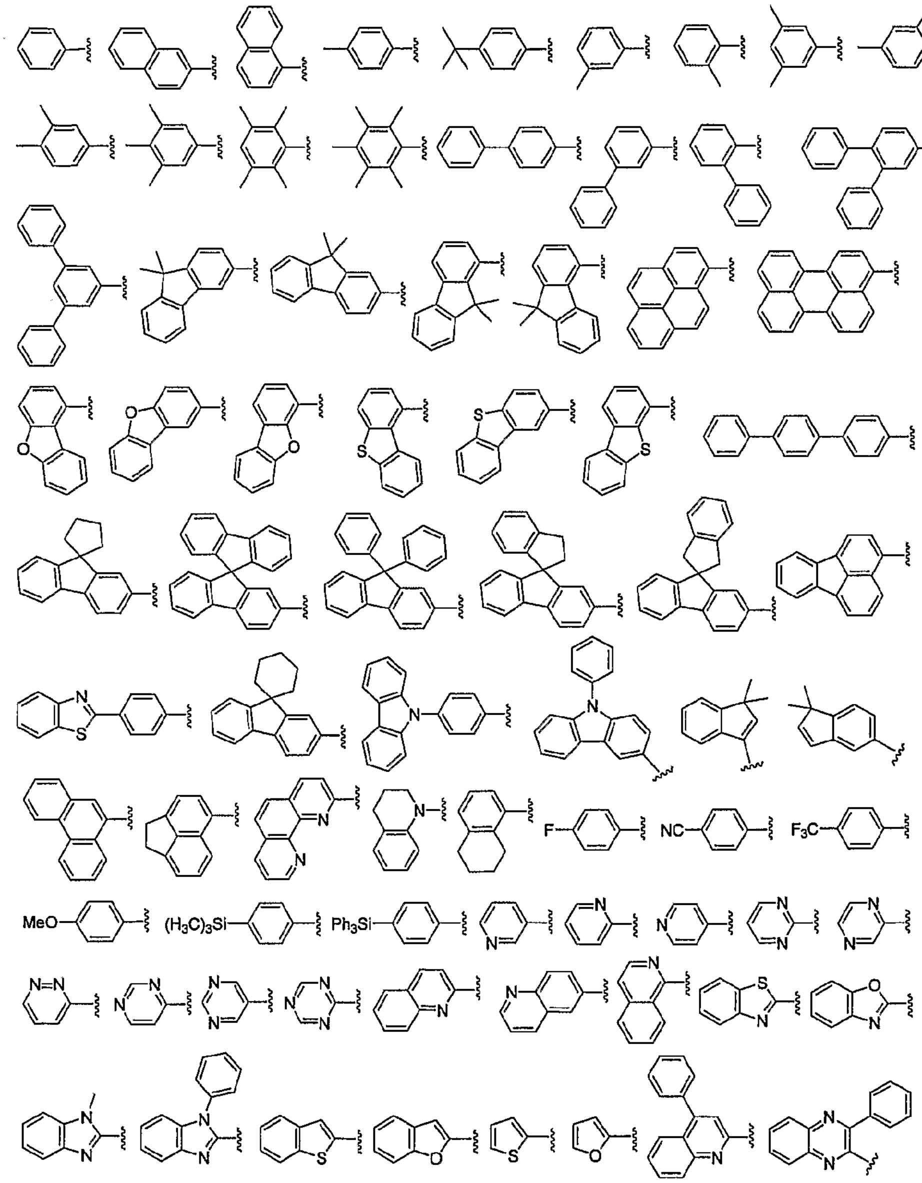
<56> the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, bicycloalkyl, alkenyl, alkynyl, alkylamino or arylamino of R_{31} through R_{45} and R_{51} through R_{64} may be further substituted by deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, (C1-C60)alkylthio, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C6-C60)arylcarbonyl, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, carboxyl, nitro or hydroxyl;

<57> b represents an integer from 1 to 5; c represents an integer from 1 to

4; and d represents an integer from 1 to 3.

<58>

<59> More specifically, R_1, R_2 and R_3 can be independently exemplified by the following structures, without restriction:



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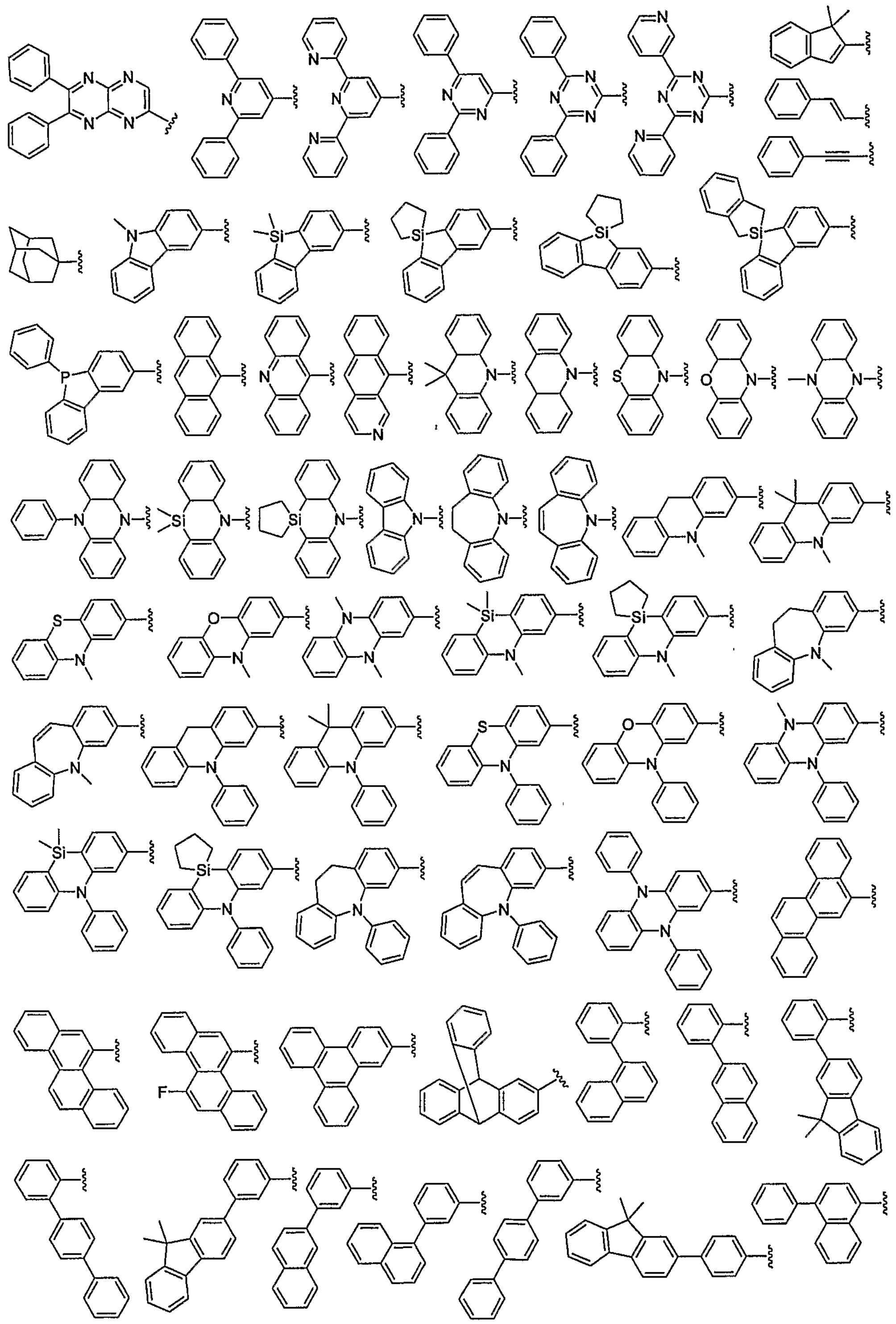

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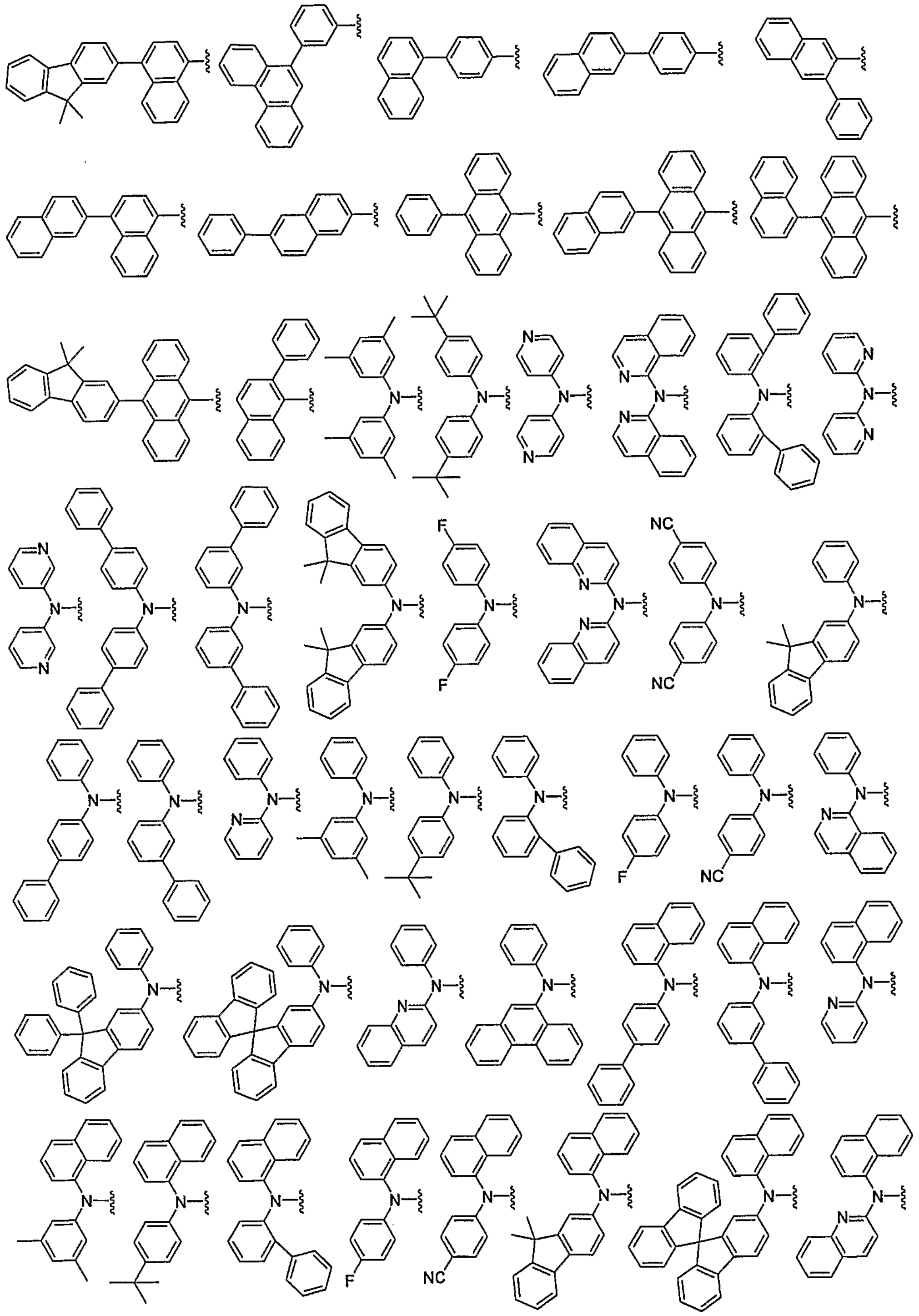

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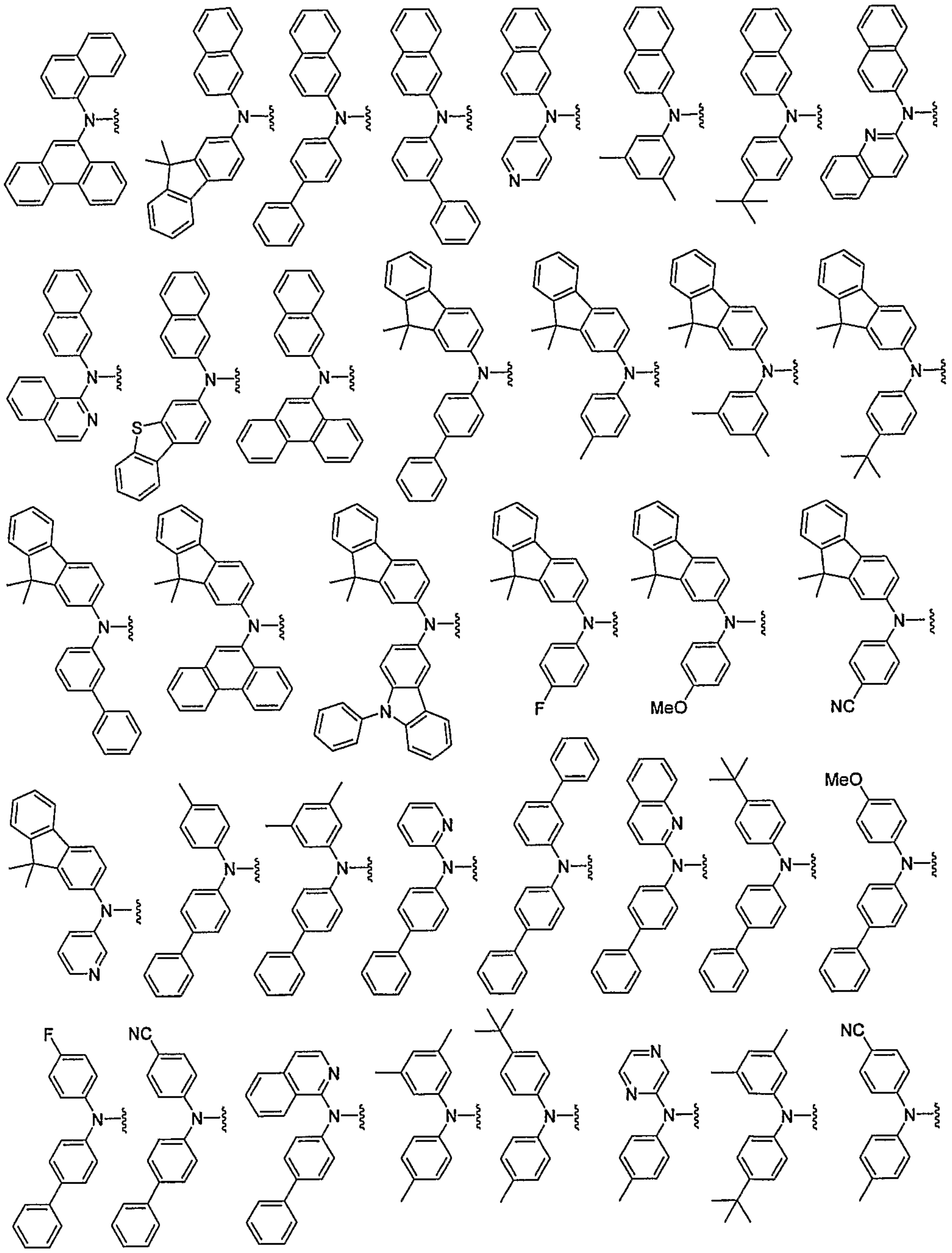

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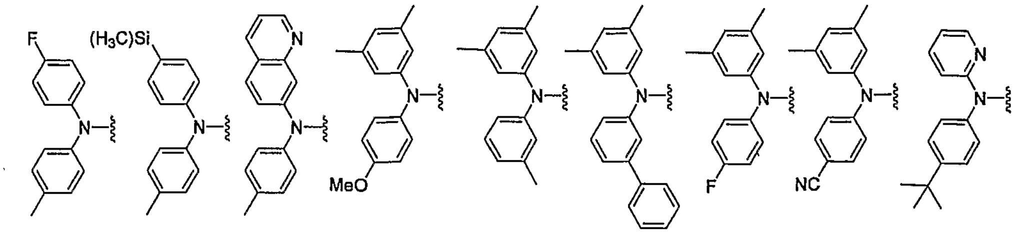

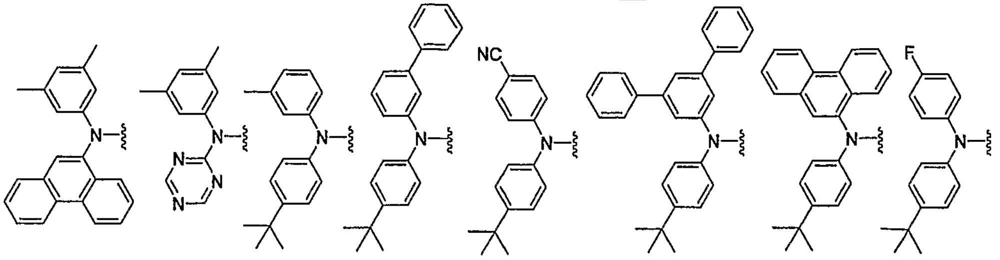

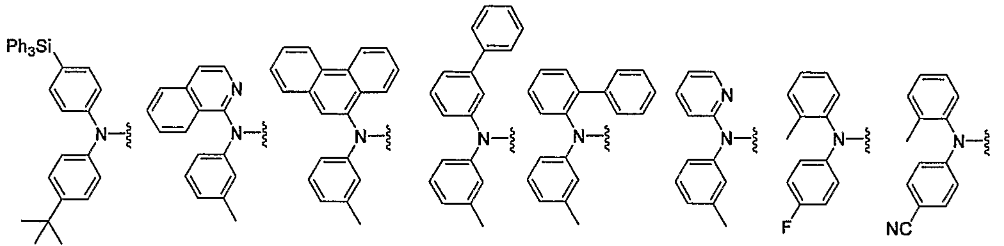

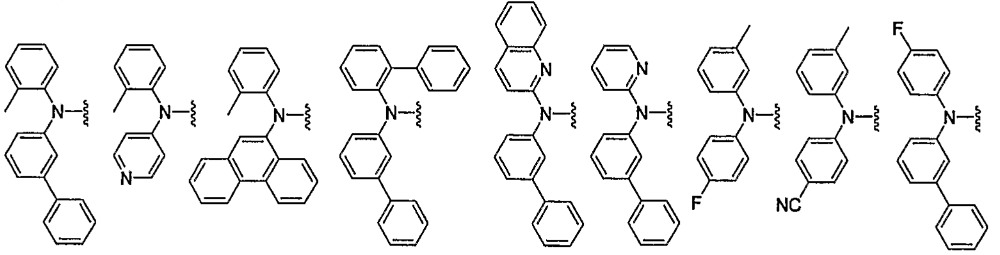

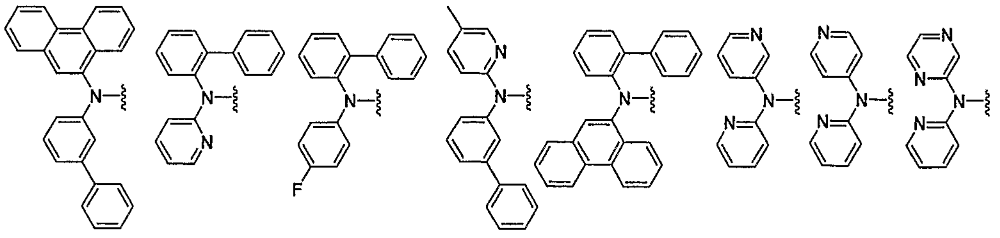

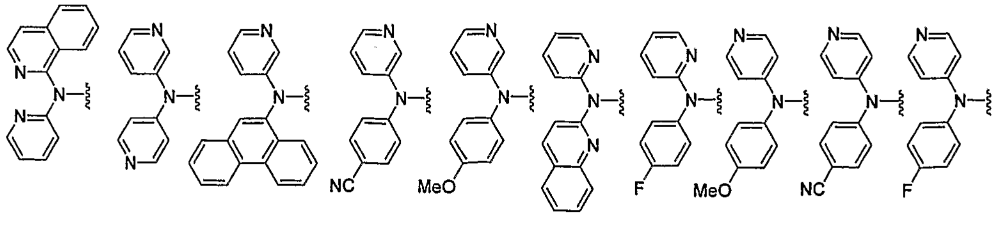

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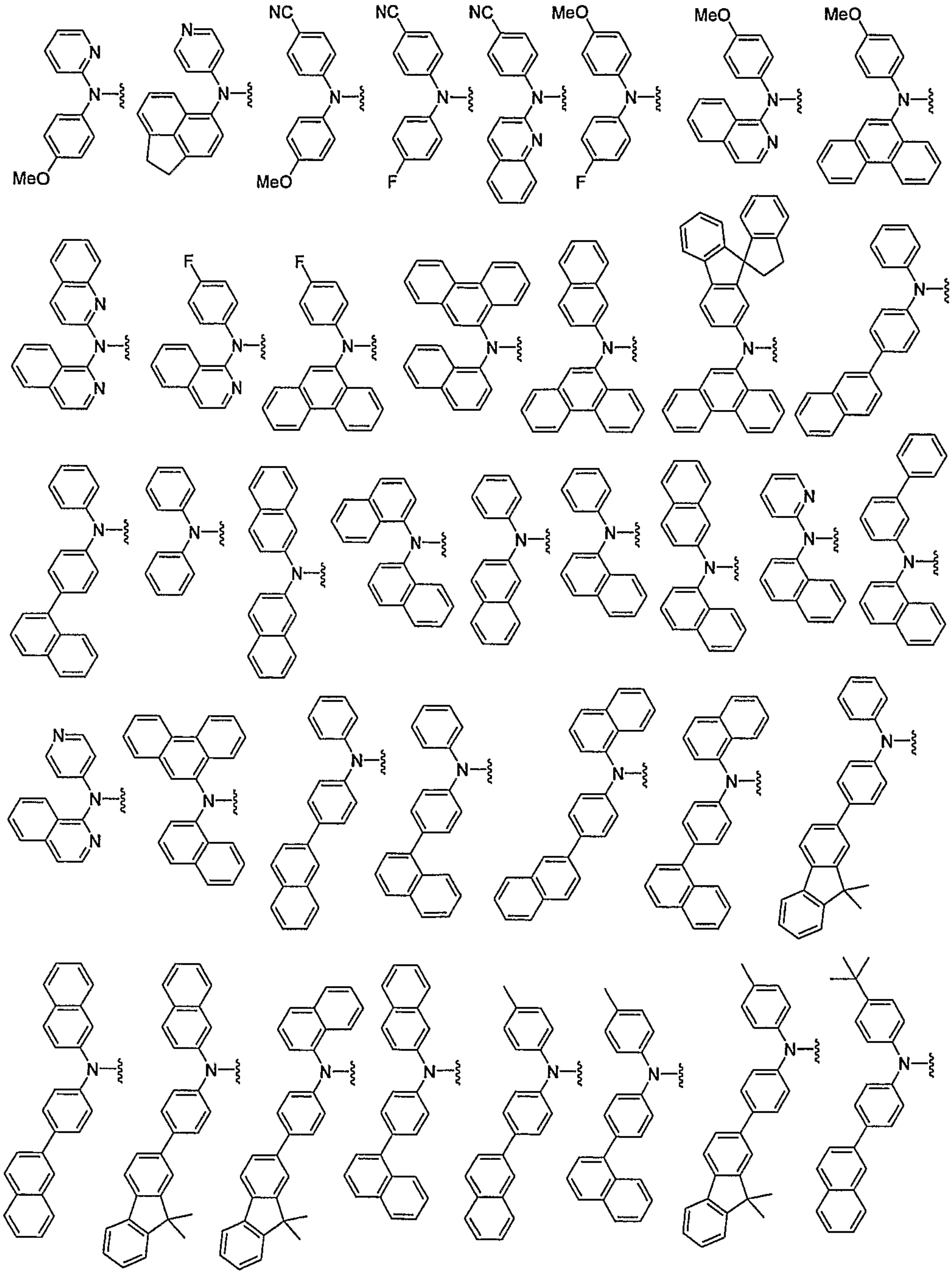

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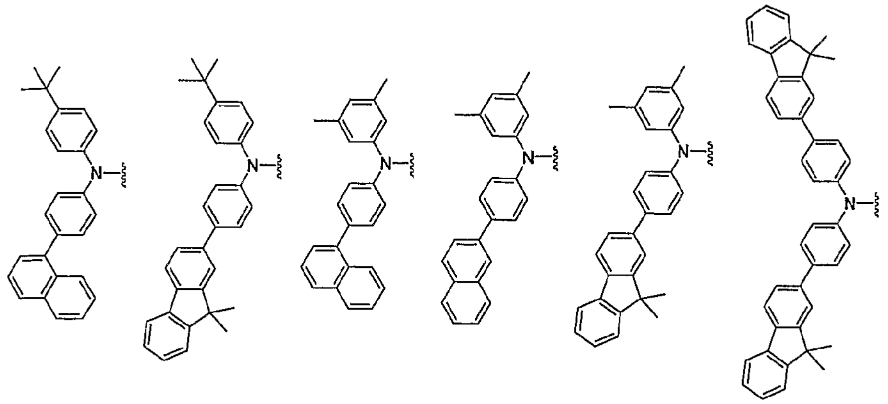
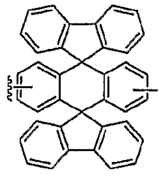
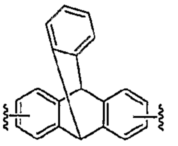
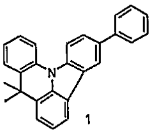


<66>

<67> In the chemical formulas, L_1, L_2 and L_3 independently represent a chemical bond, or arylene or heteroarylene selected from the phenylene, naphthylene, biphenylene, fluorenylene, phenanthrylene, anthrylene, fluoranthenylene, triphenylenylene, pyrenylene, chrysenylene, naphthacenylene, perylenylene, spirobifluorenyl, tetrahydronaphthylene, acenaphthenylene, indenylene, pyridylene, bipyridylene, pyrrolylene, furylene, thienylene, imidazolylene, benzimidazolylene, pyrazinylene, pyrimidinylene, pyridazinylene, quinolinylene, triazinylene, benzofurylene, dibenzofurylene, benzothienylene, dibenzothienylene, pyrazolylene, indolylene, carbazolylene, indenocarbazolylene, thiazolylene, oxazolylene, benzothiazolylene, benzoxazolylene, phenanthridinylene, phenanthrolinylene, piperidinylene, quinazolinylene,  or ; and the arylene or heteroarylene of L_1, L_2 and L_3 may be further substituted by one or more substituent(s) selected from a group consisting of deuterium, halogen, (C1-C60)alkyl, halo(C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, cyano, carbazolyl, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, carboxyl, nitro and

hydroxyl.

<68> The organic electroluminescent compounds according to the present invention can be more specifically exemplified by the following compounds, but they are not restricted thereto: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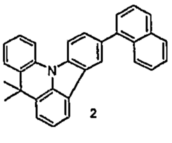
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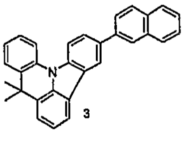
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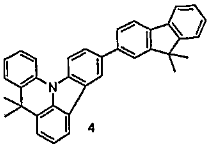
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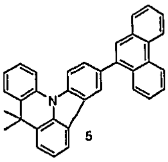
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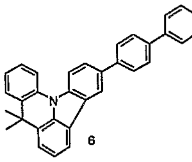
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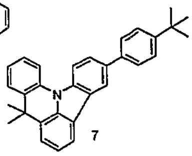
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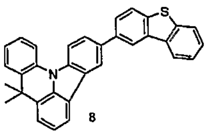
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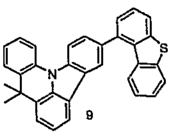
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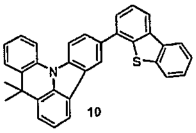
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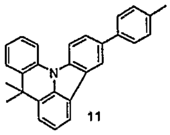
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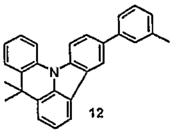
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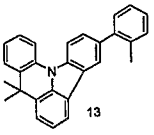
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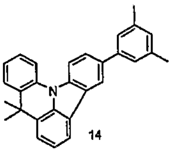
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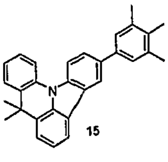
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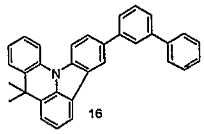
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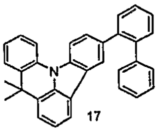
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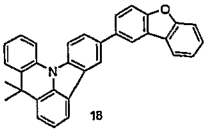
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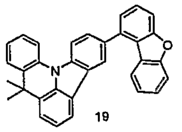
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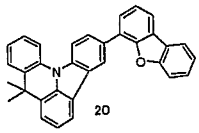
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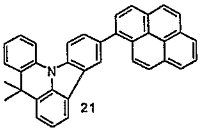
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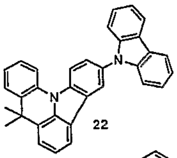
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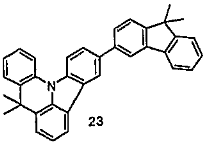
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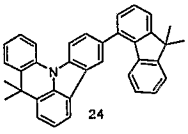
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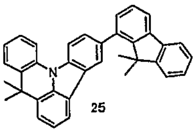
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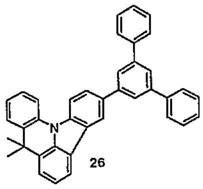
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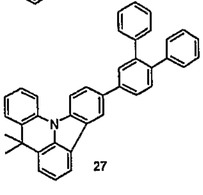
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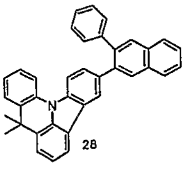
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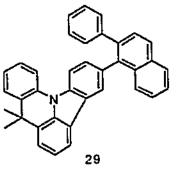
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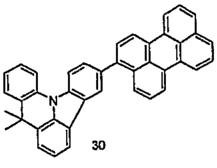
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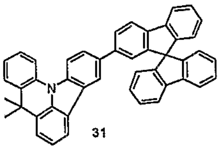
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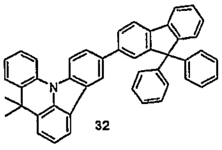
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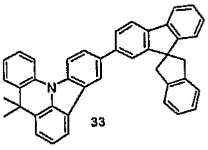
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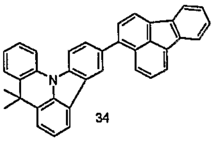
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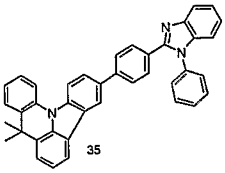
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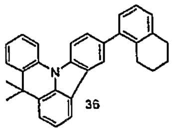
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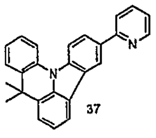
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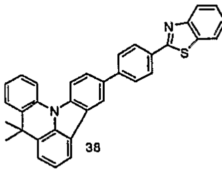
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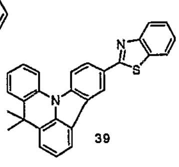
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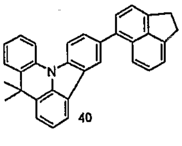
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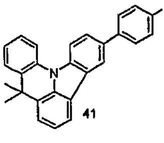
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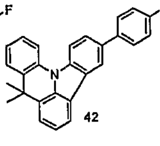
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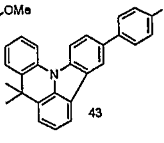
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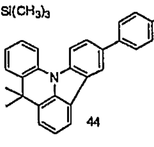
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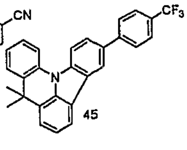
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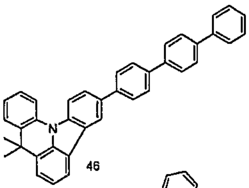
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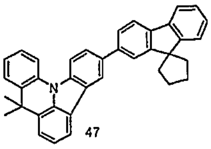
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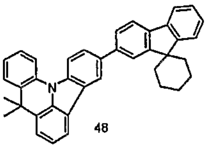
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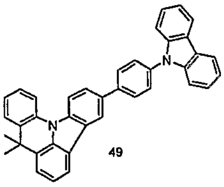
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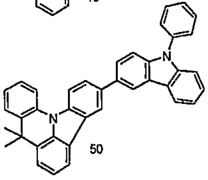
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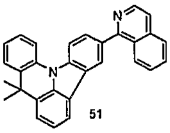
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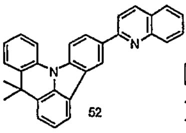
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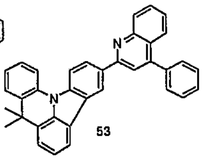
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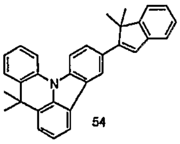
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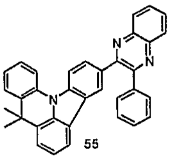
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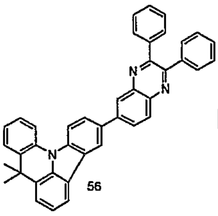
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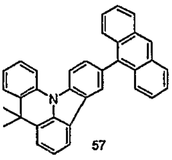
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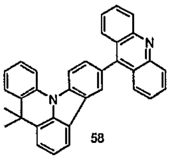
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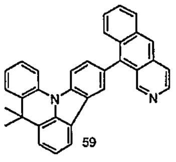
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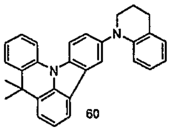
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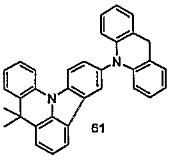
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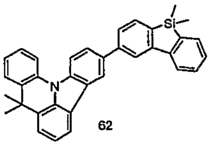
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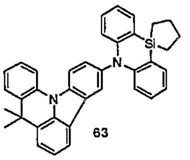
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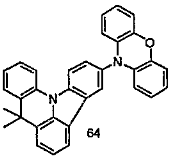
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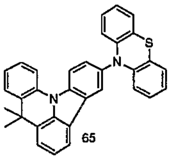
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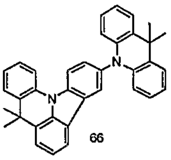
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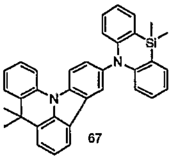
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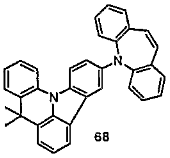
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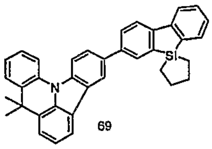
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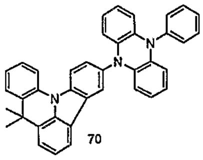
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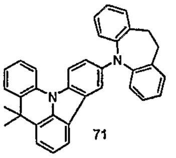
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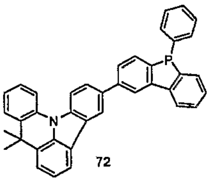
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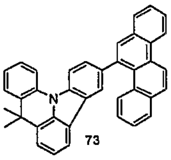
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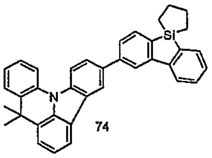
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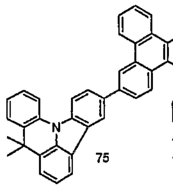
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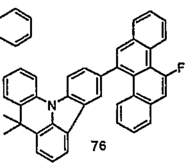
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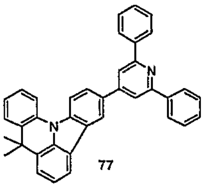
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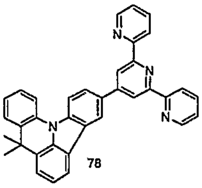
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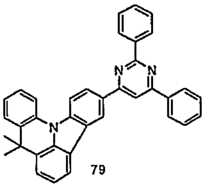
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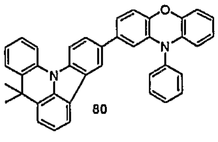
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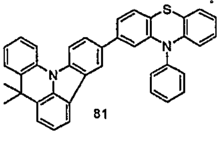
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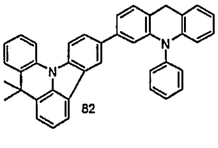
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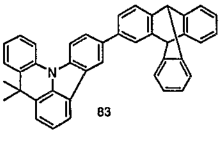
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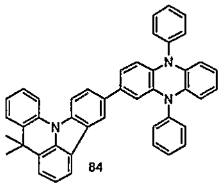
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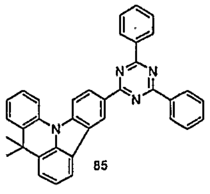
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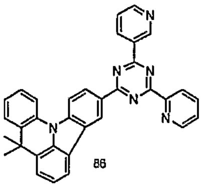
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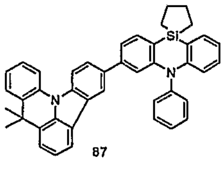
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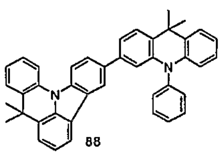
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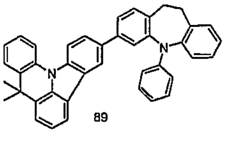
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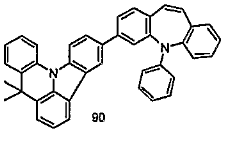
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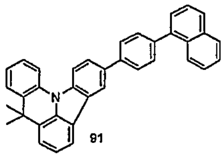
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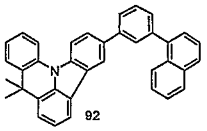
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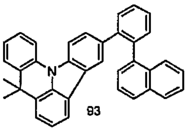
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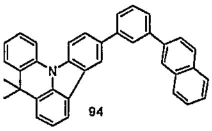
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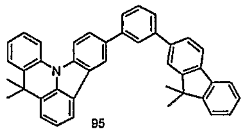
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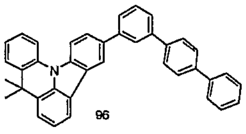
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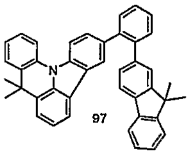
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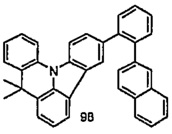
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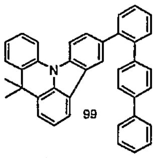
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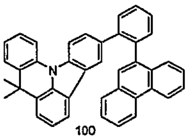
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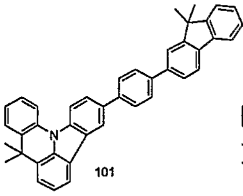
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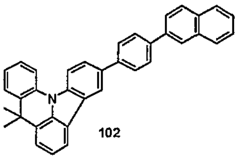
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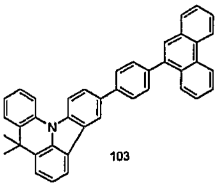
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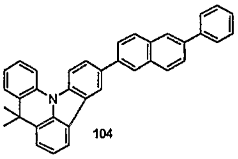
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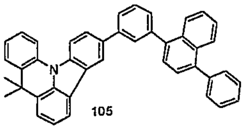
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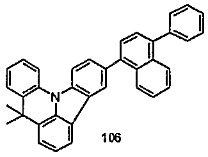
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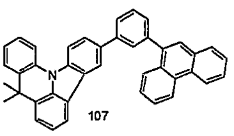
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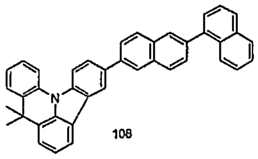
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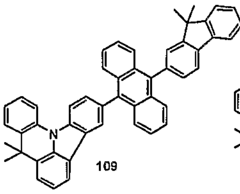
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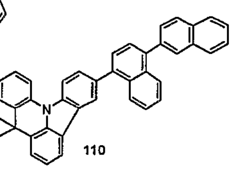
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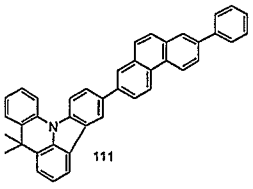
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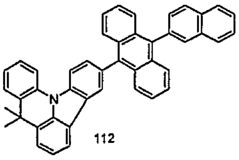
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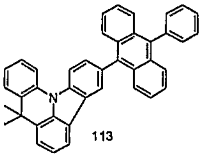
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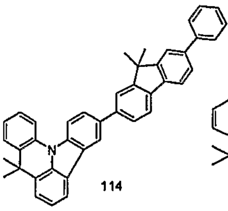
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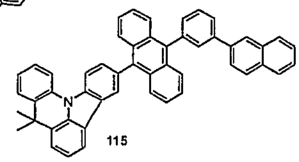
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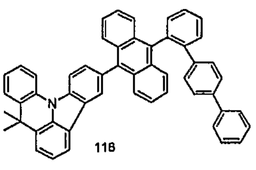
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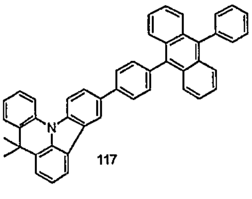
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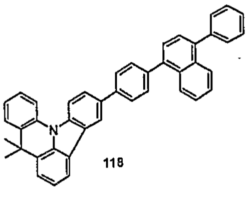
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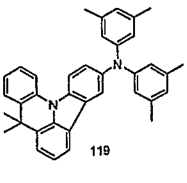
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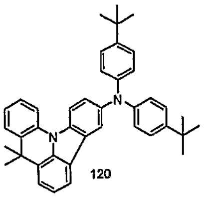
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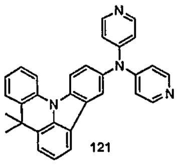
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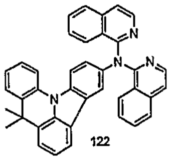
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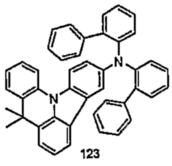
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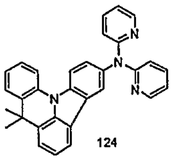
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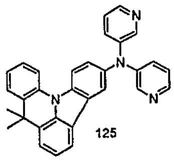
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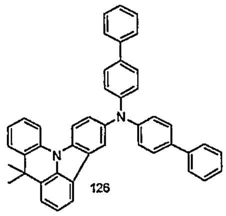
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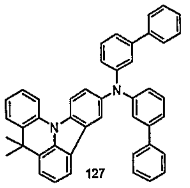
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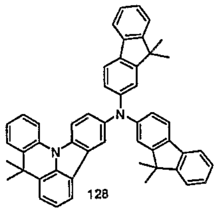
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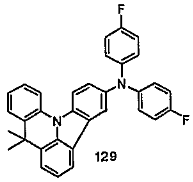
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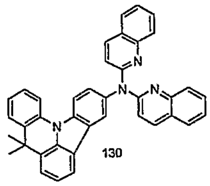
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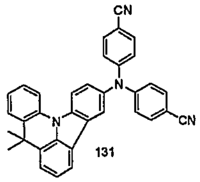
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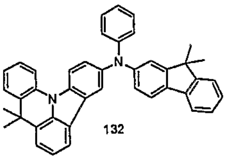
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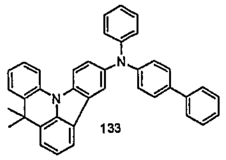
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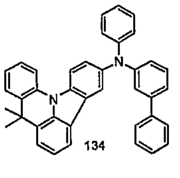
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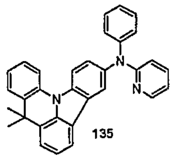
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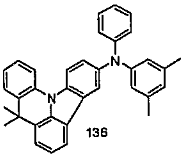
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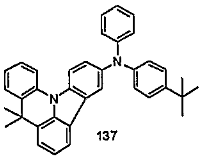
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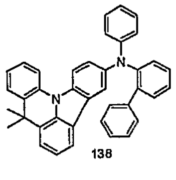
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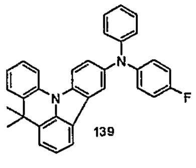
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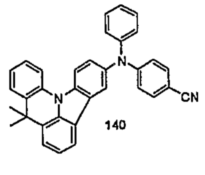
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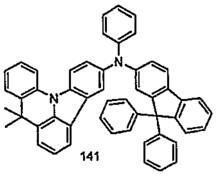
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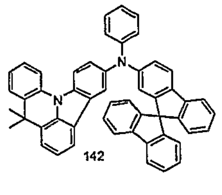
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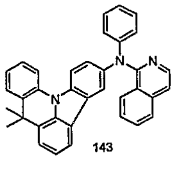
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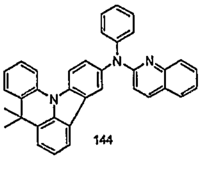
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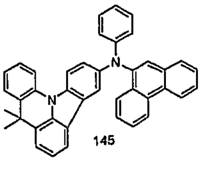
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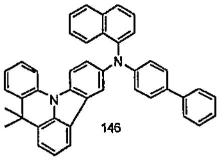
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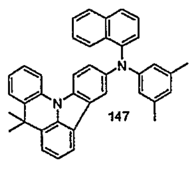
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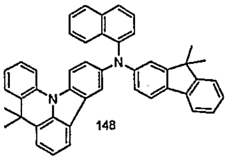

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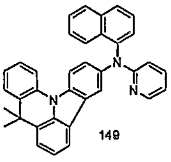

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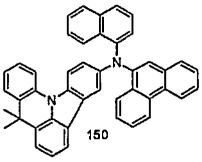

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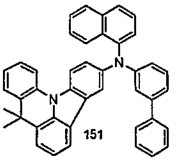

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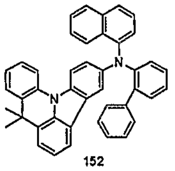

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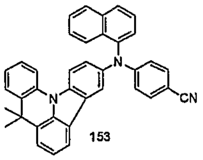

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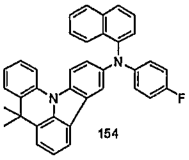

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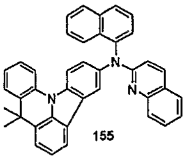

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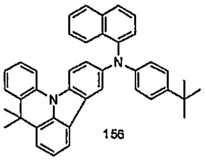

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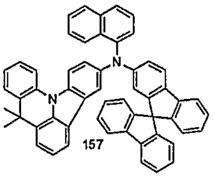

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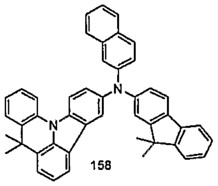

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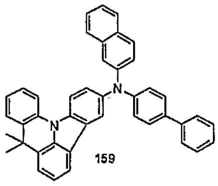

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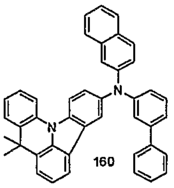

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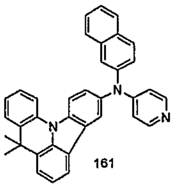

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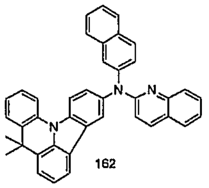

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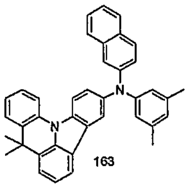

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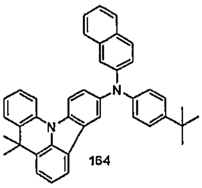

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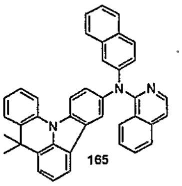

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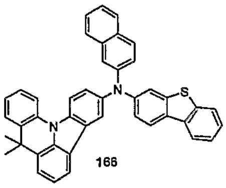

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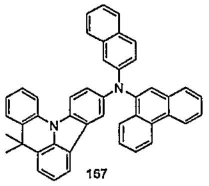

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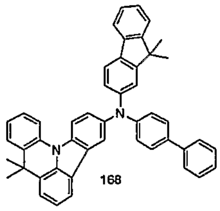

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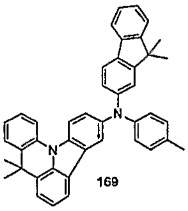

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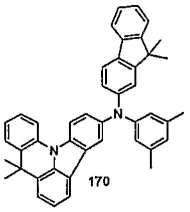

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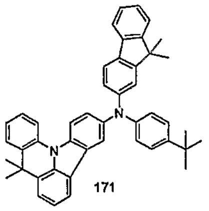

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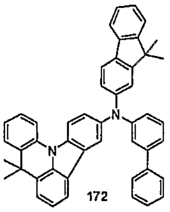

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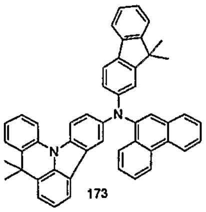

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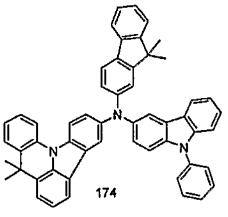

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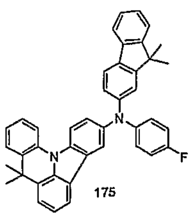

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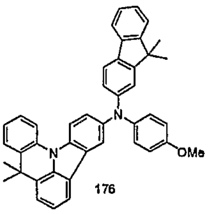

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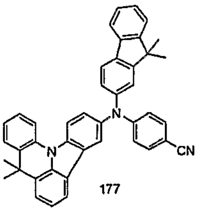

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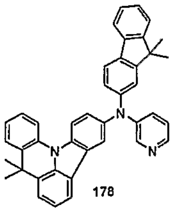

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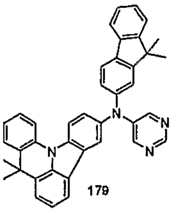

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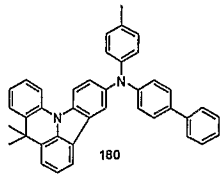

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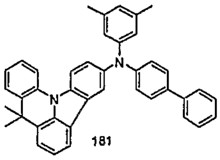

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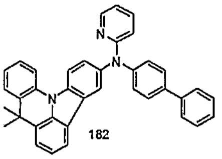

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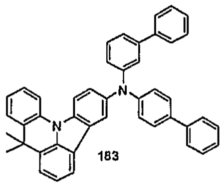

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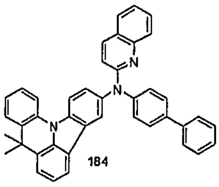

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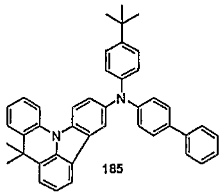

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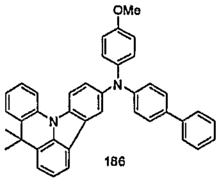

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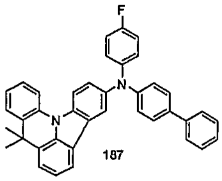

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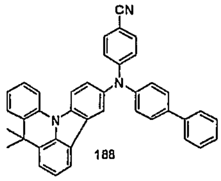

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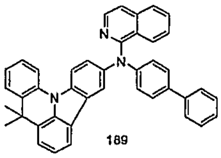

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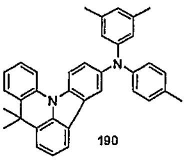

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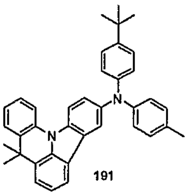

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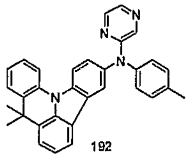

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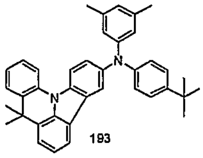

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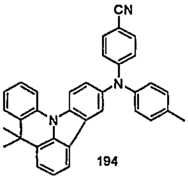

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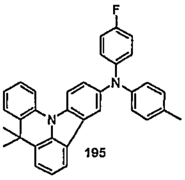

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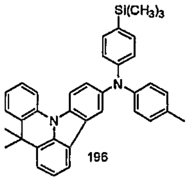

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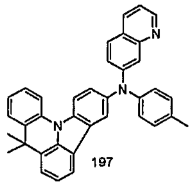

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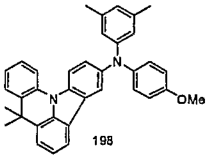

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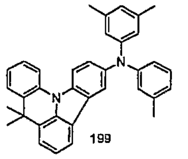

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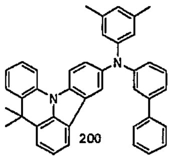

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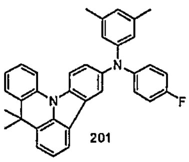

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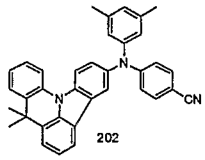

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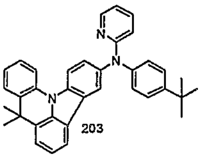

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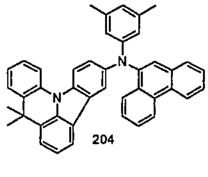

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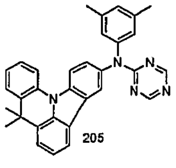

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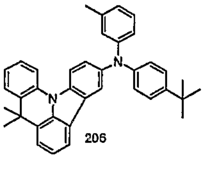

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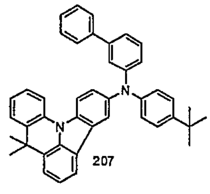

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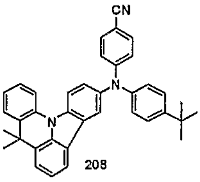

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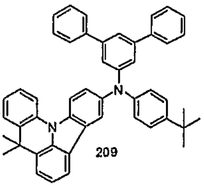

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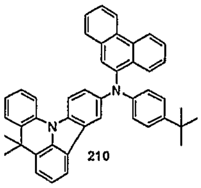

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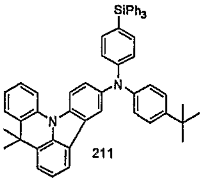

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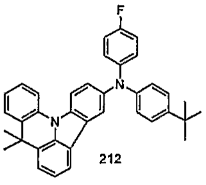

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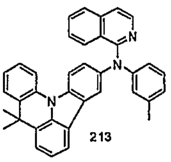
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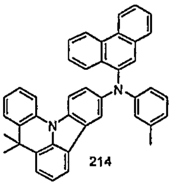
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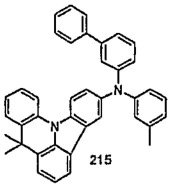
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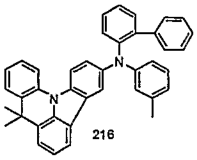
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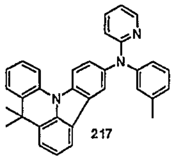
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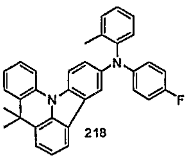
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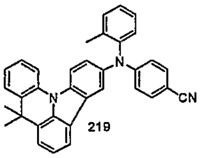
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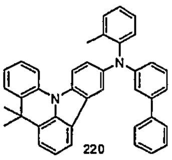
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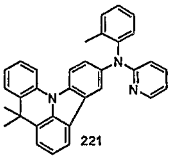
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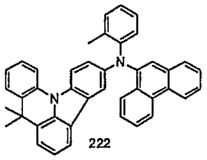
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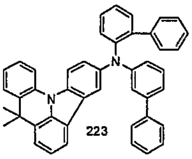
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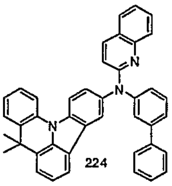
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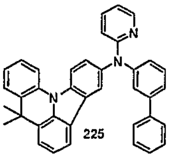
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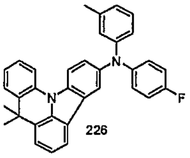
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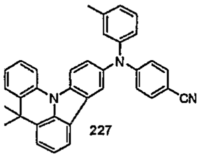
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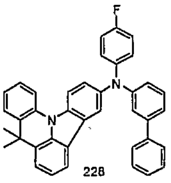
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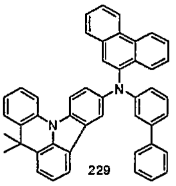
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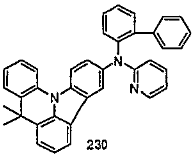
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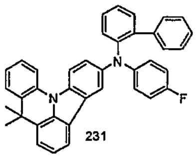
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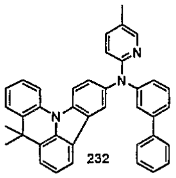
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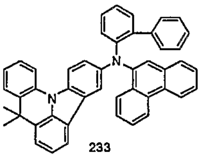
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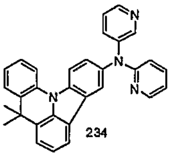
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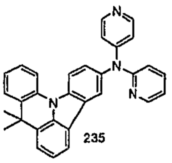
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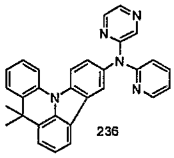
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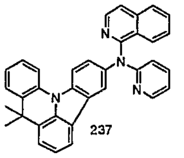
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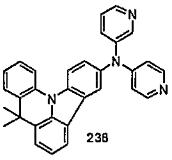
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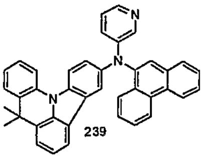
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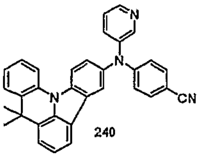
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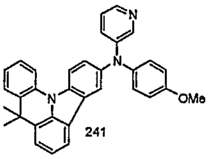
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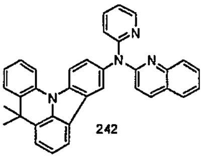
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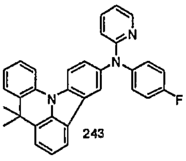
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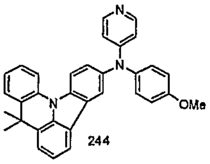
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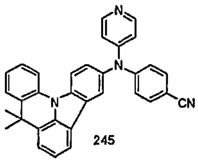
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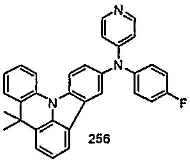
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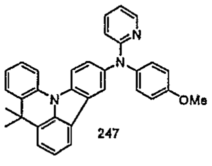
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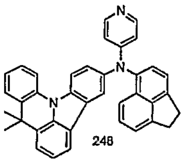
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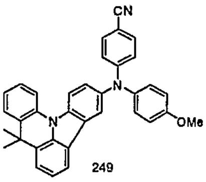
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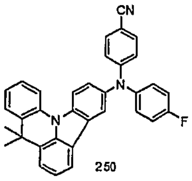
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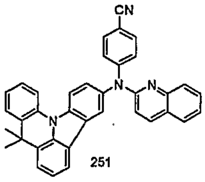
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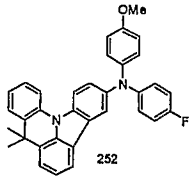
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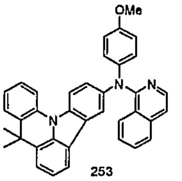
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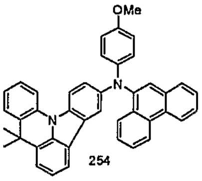
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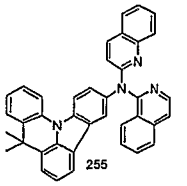
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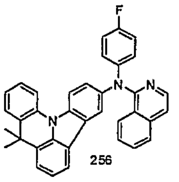
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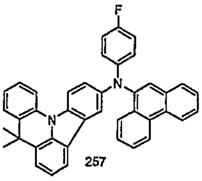
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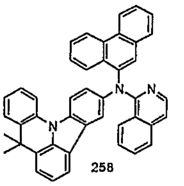
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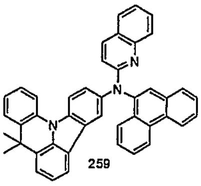
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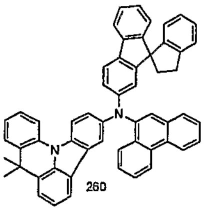
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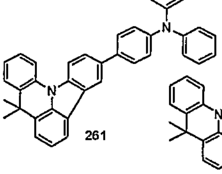
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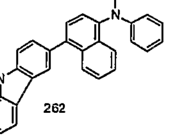
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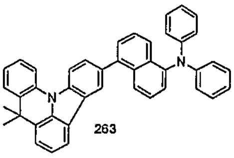
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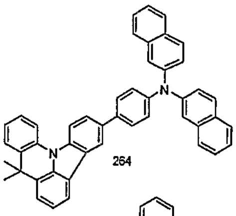
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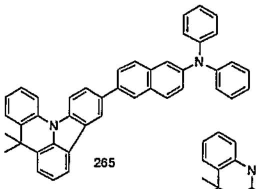
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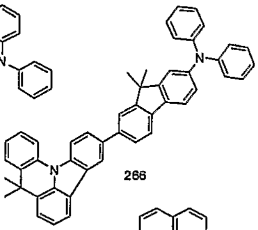
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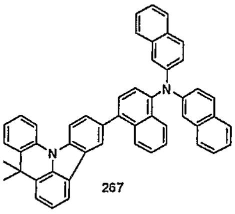
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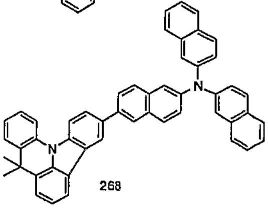
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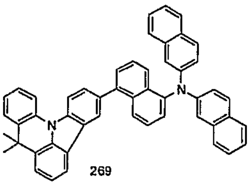
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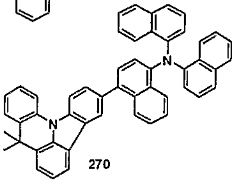
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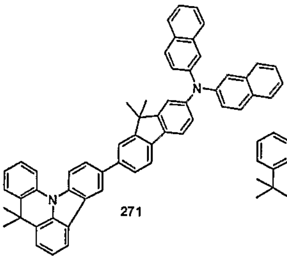
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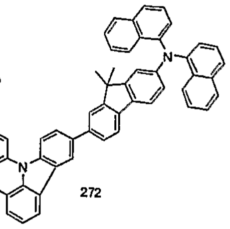
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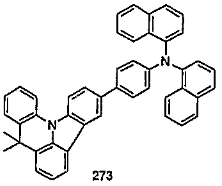
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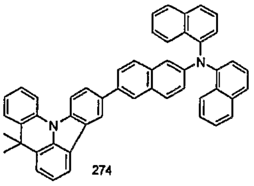
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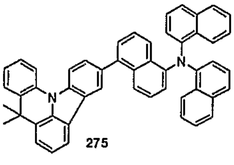
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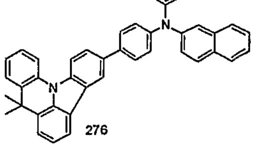
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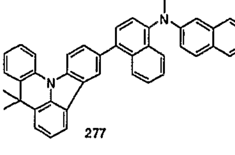
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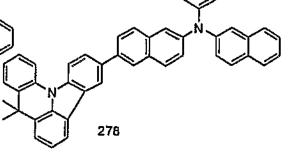
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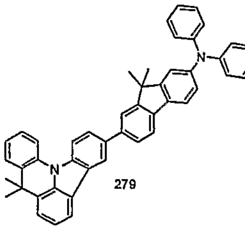
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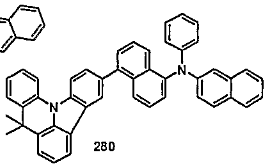
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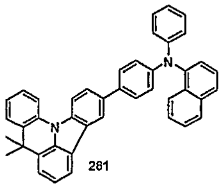
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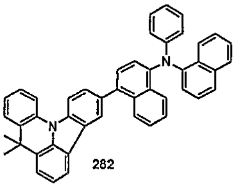
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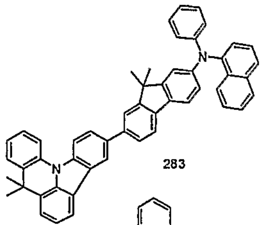
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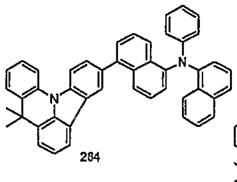
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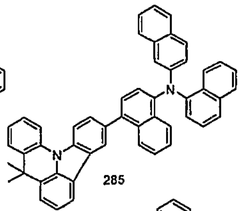
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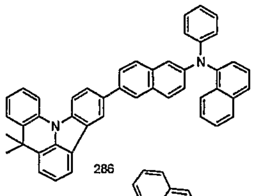
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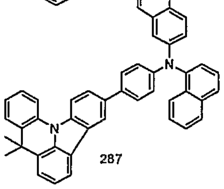
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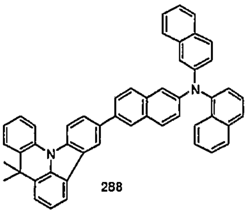
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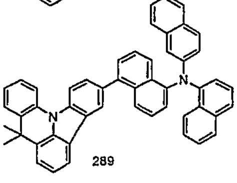
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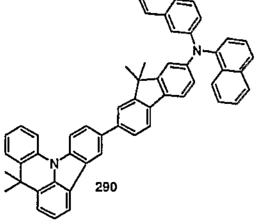
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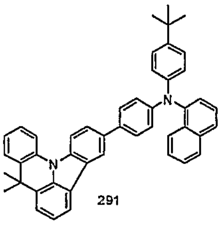
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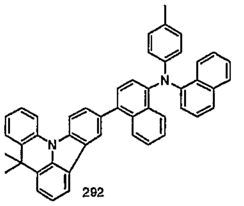
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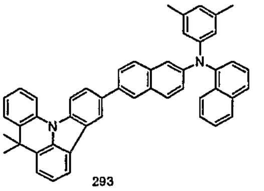
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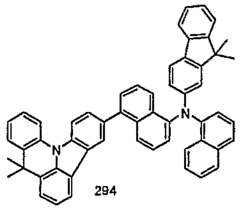
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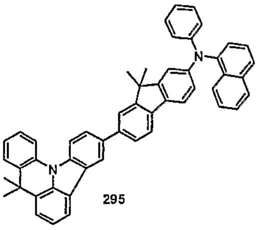
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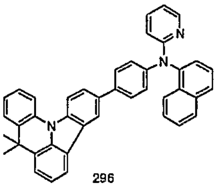
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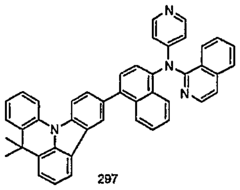
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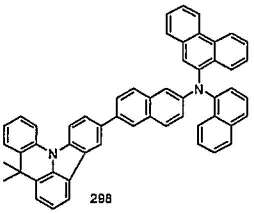
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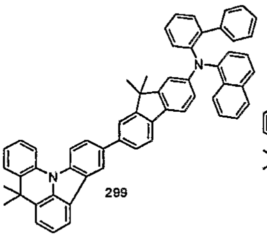
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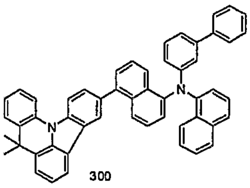
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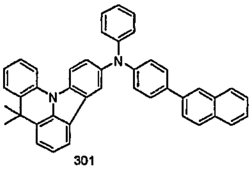
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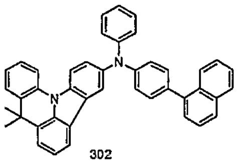
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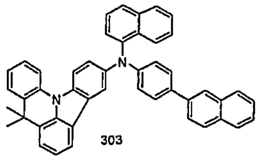
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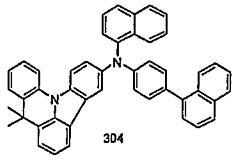
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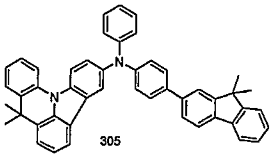
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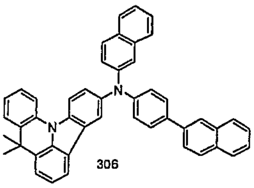
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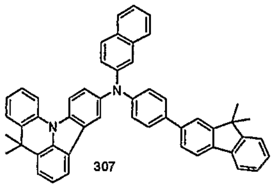
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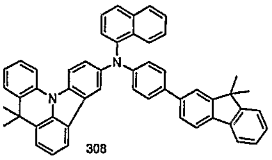
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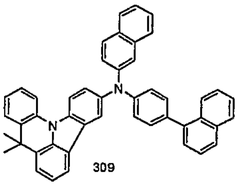
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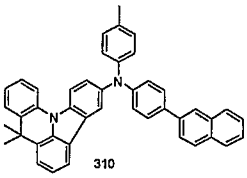
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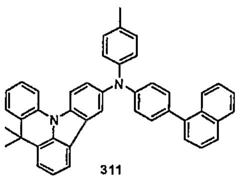
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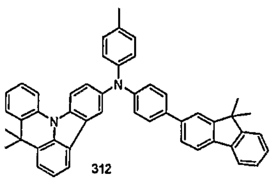
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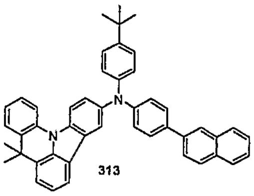
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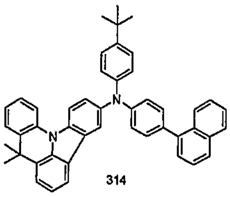
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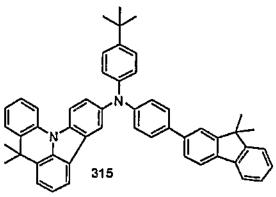
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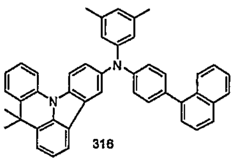
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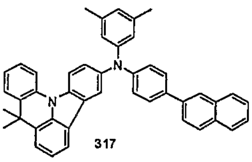
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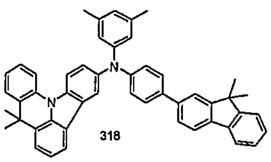
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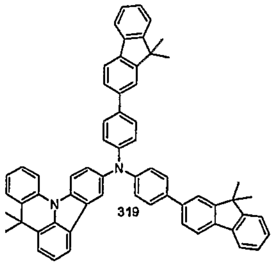
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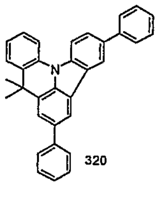
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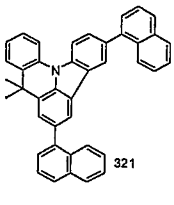
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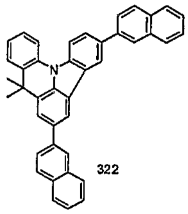
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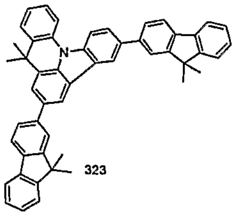
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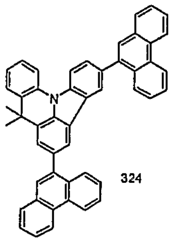
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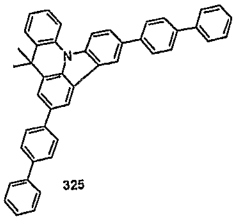
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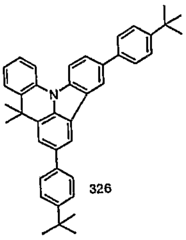
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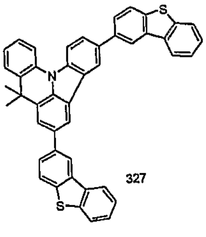
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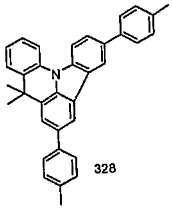
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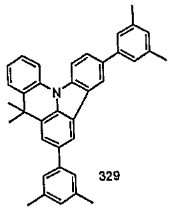
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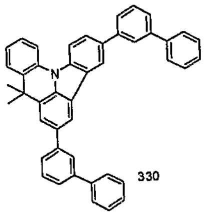
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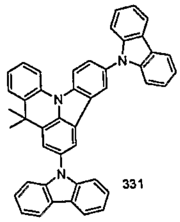
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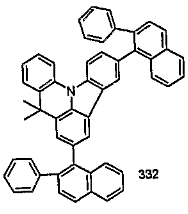
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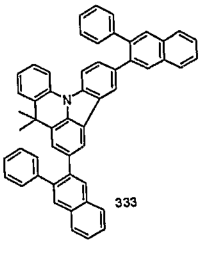
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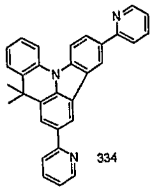
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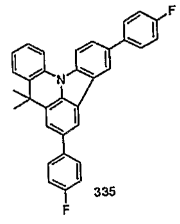
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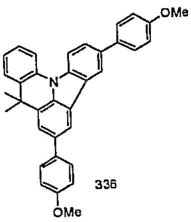
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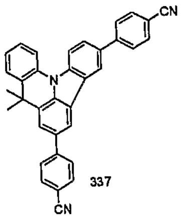
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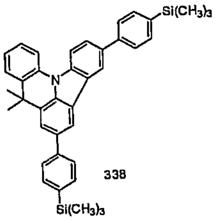
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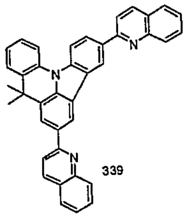
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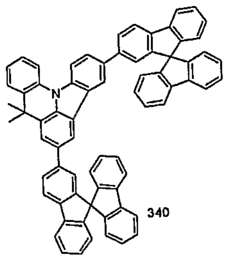
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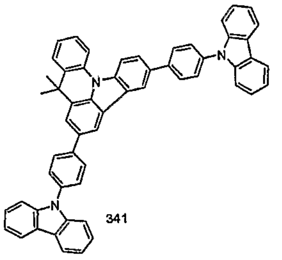
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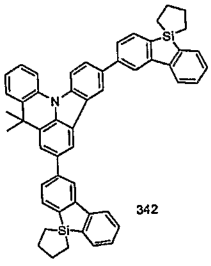
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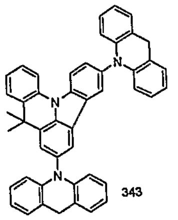
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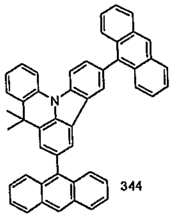
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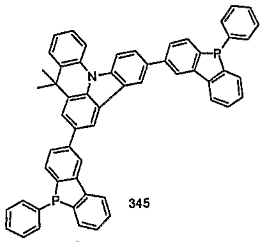
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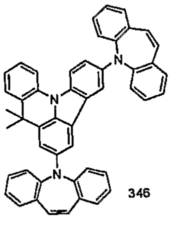
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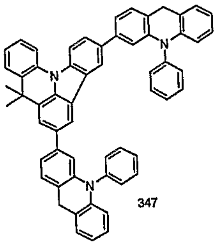
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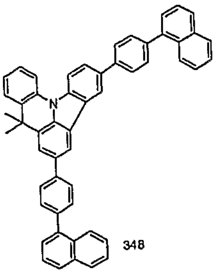

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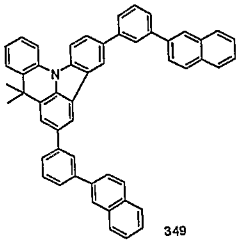

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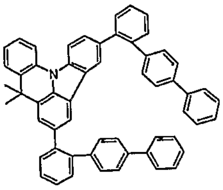

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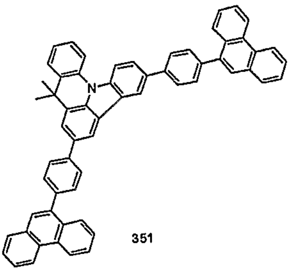

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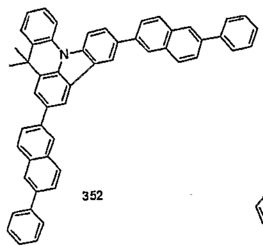

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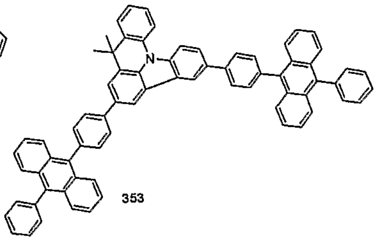

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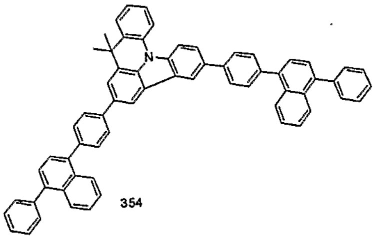

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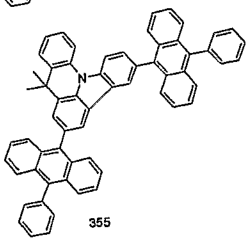

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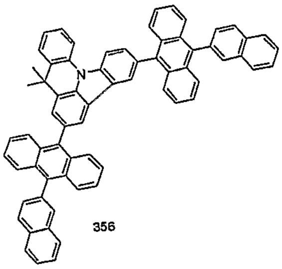

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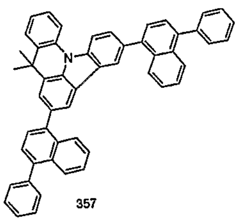

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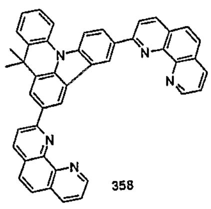

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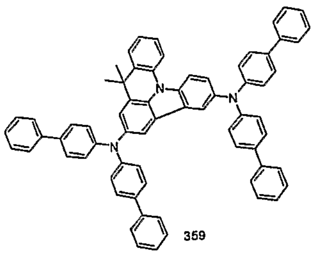

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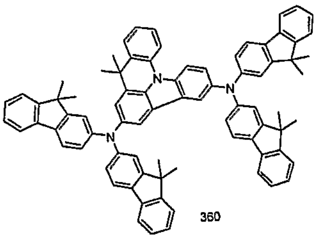

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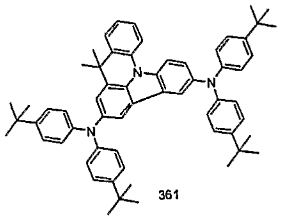

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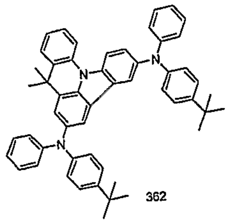

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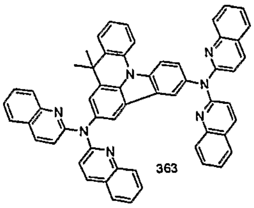

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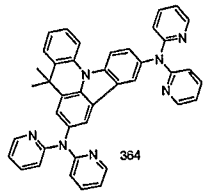

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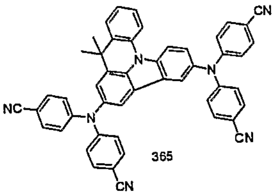

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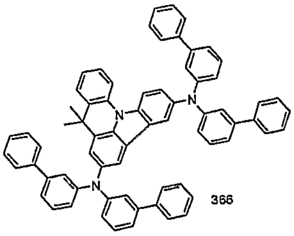
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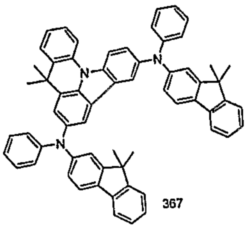
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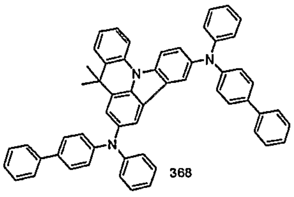
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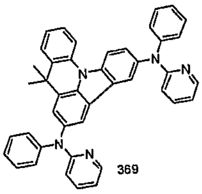
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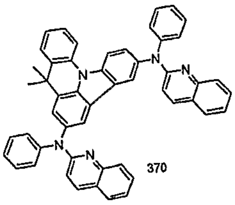
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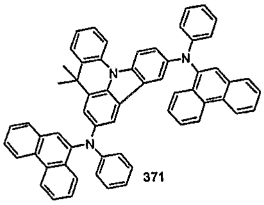
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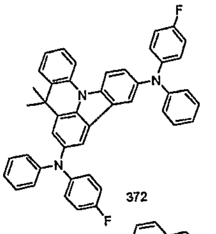
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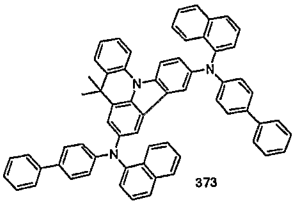
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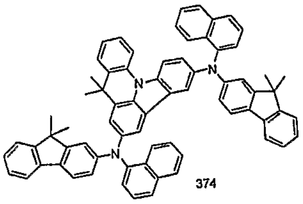
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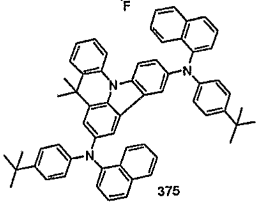
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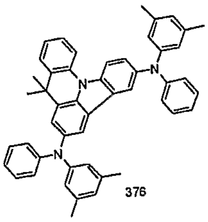
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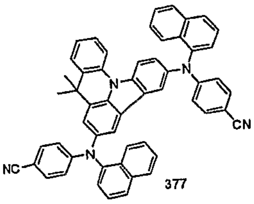
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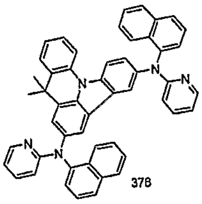
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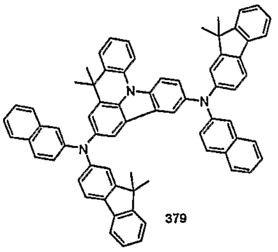
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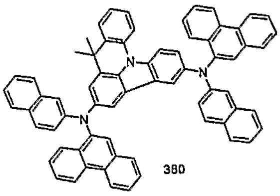
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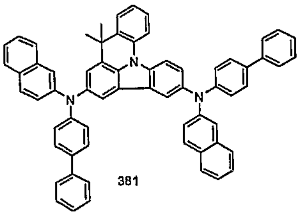
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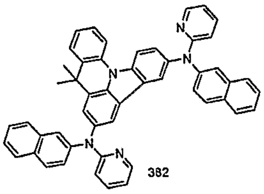
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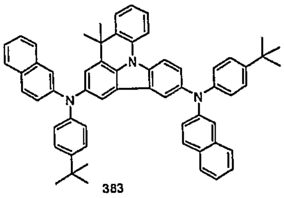
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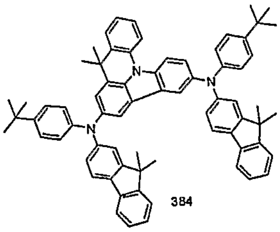
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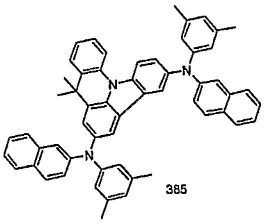
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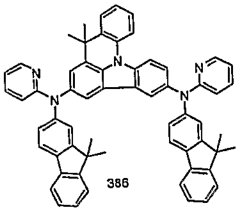
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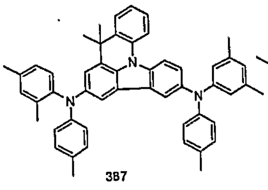
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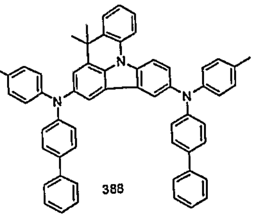
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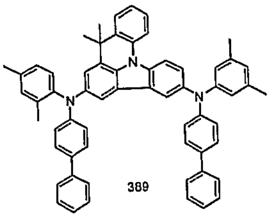
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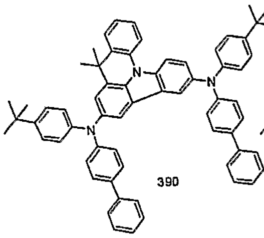
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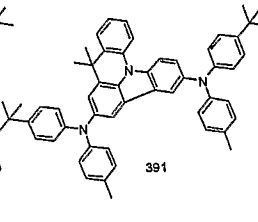
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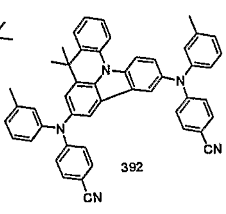
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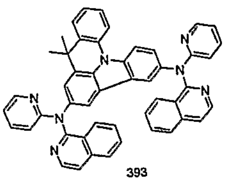
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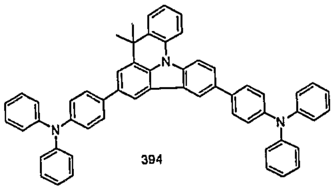
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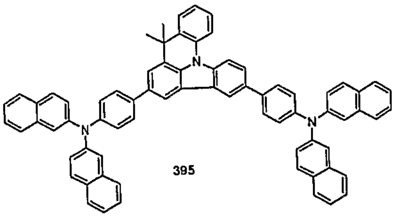
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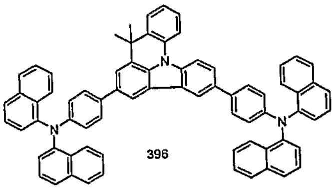
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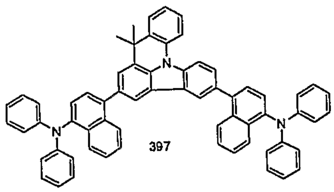
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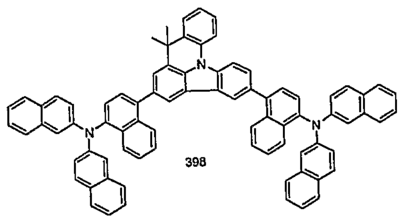
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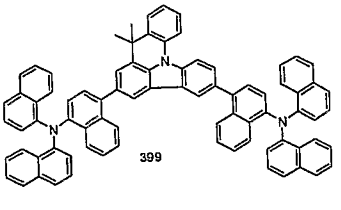
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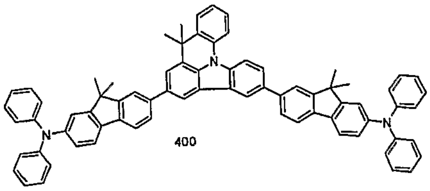
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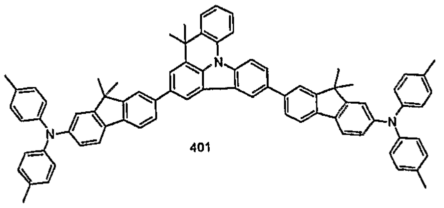
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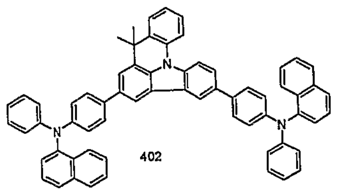
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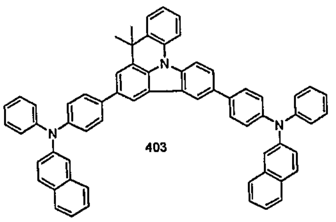
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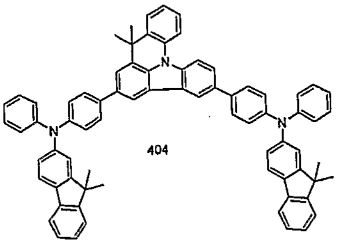
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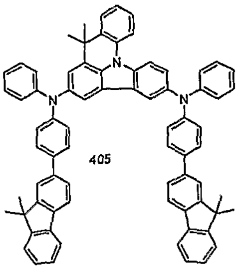
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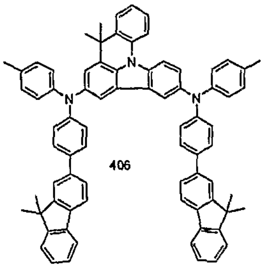
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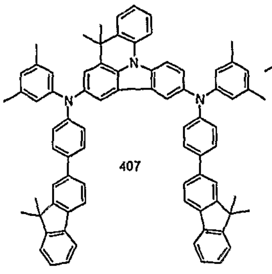
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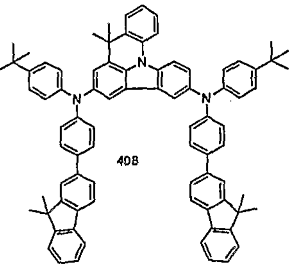
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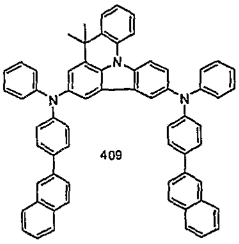
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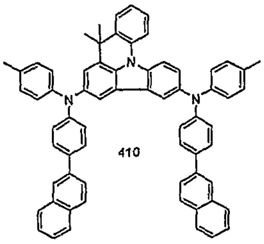
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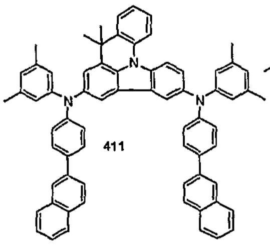
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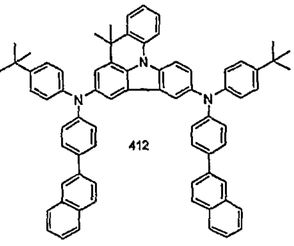
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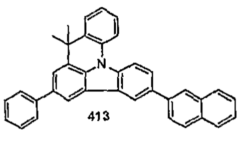
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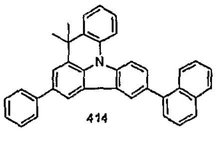
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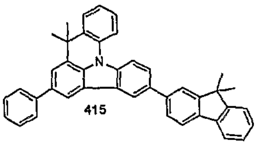
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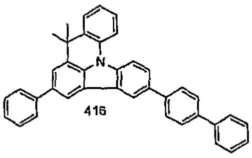
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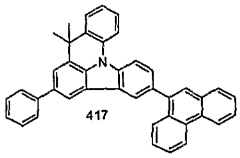
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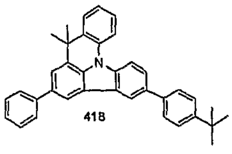
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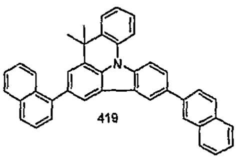
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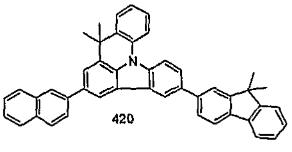
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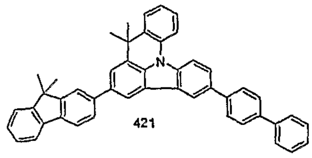
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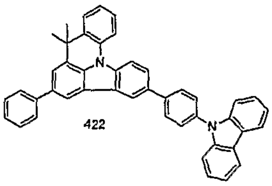
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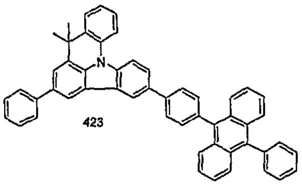
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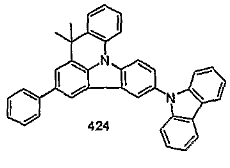
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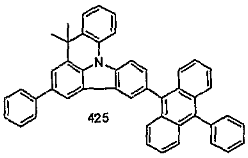
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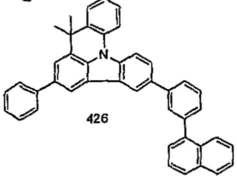
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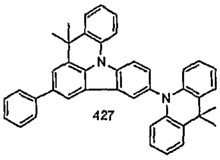
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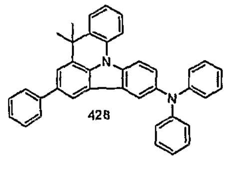
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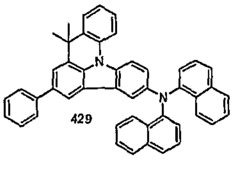
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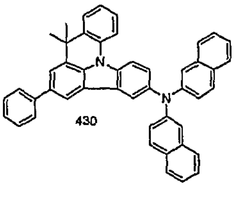
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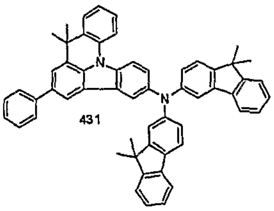
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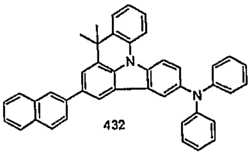
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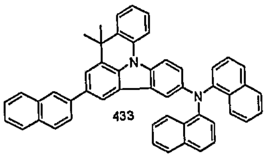
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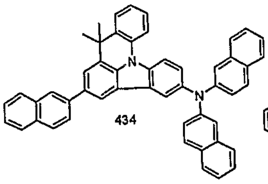
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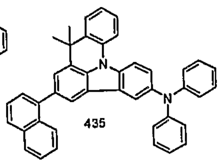
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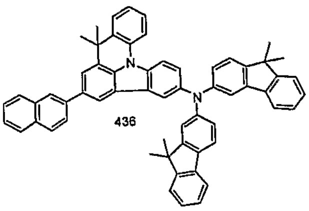
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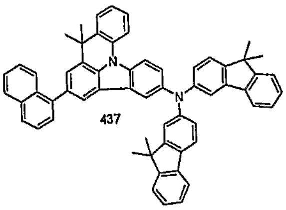
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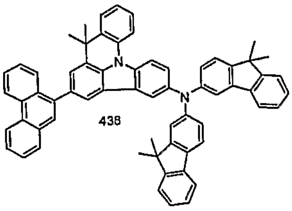
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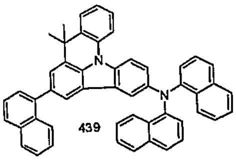
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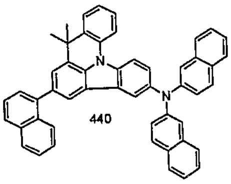
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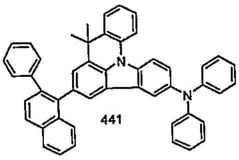
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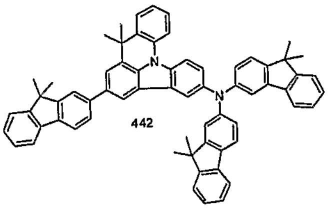
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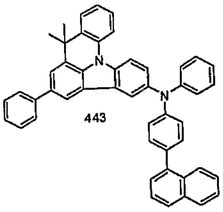
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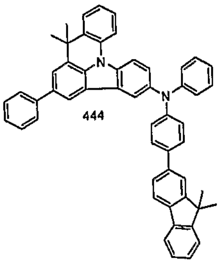
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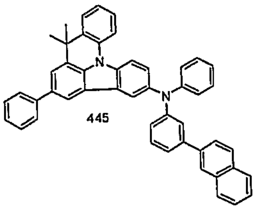
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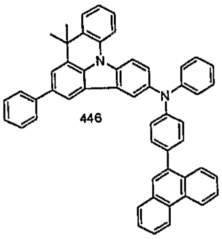
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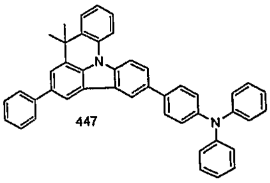
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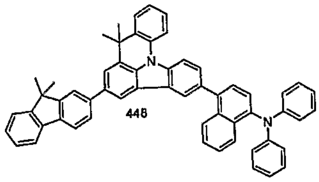
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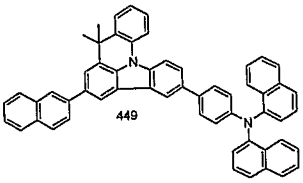
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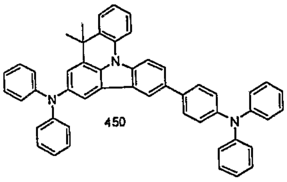
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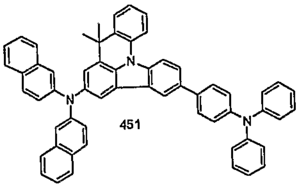
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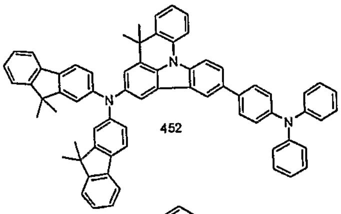
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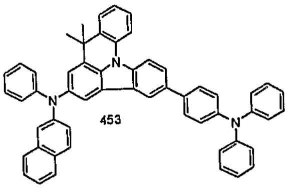
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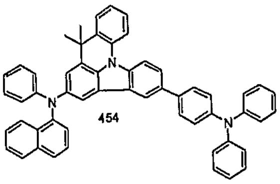
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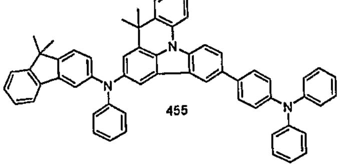
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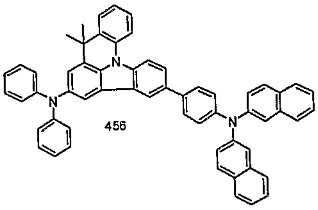
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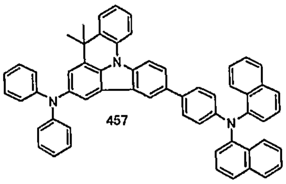
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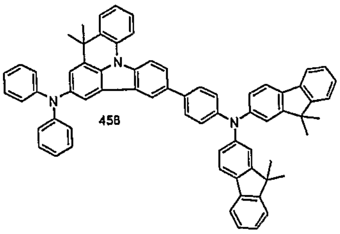
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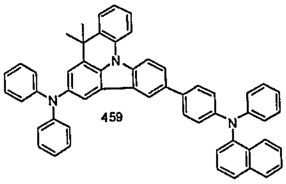
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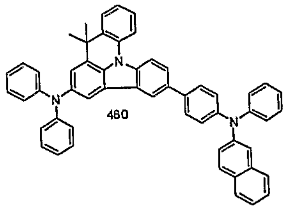
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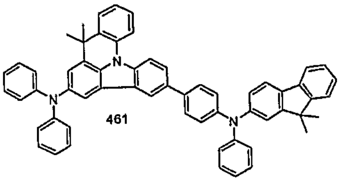
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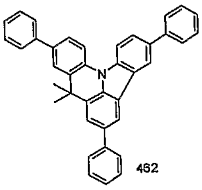
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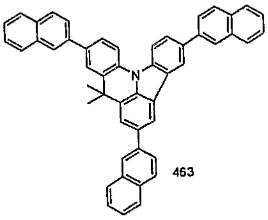
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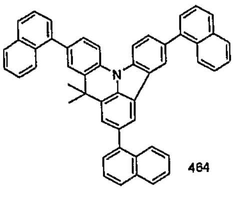
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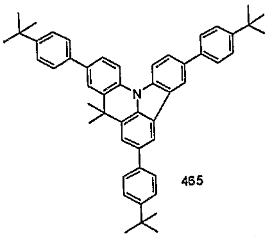
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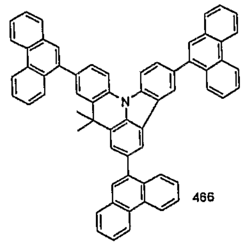
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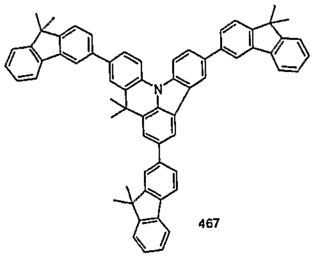
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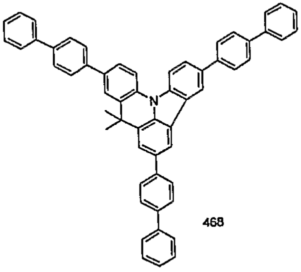
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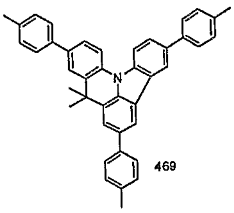
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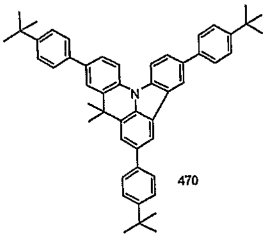
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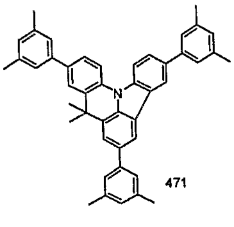
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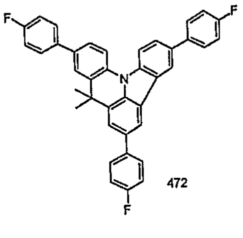
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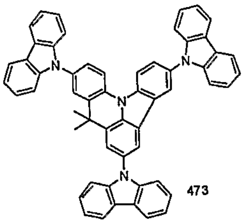
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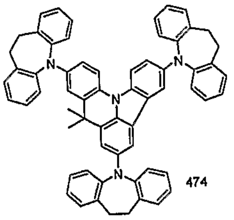
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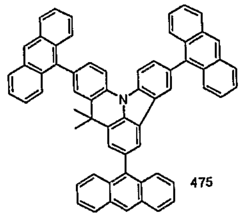
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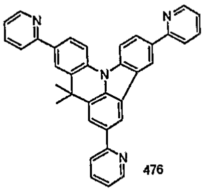
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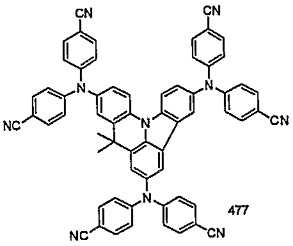
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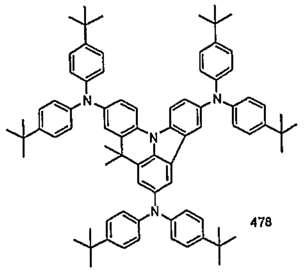
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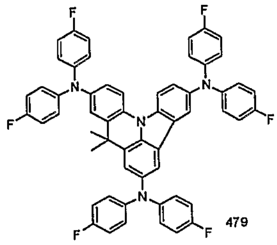
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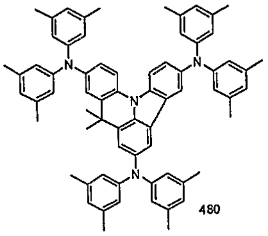
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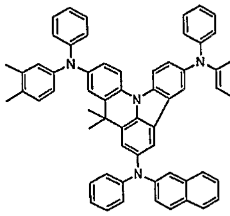
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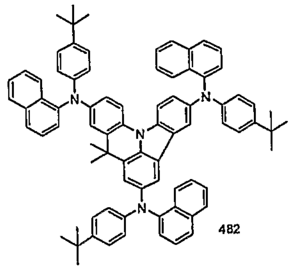
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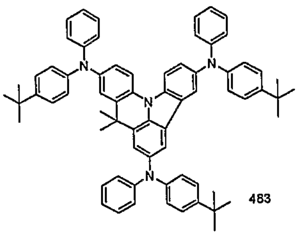
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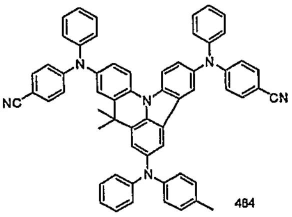
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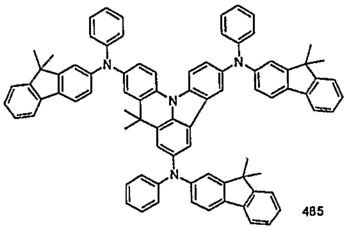
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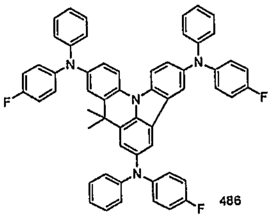
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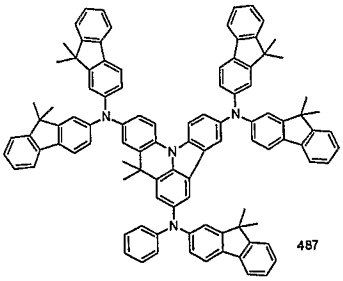
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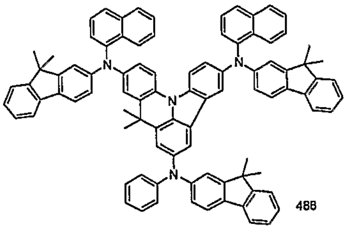
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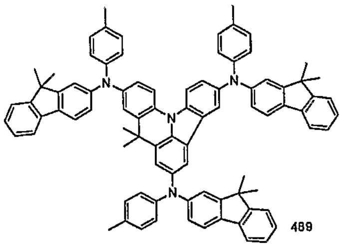
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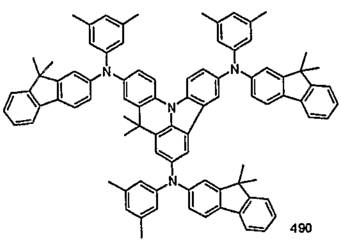
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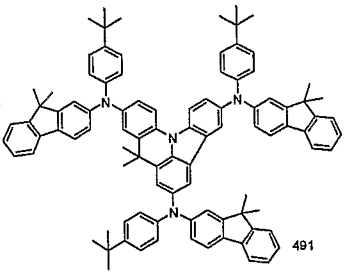
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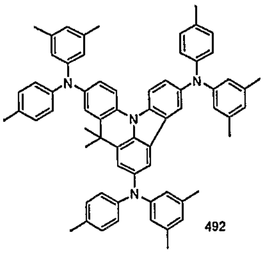
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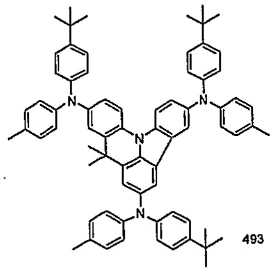
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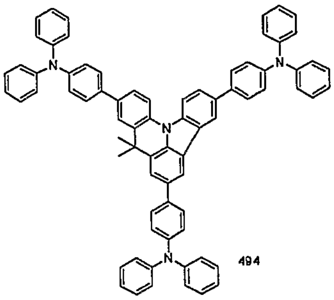
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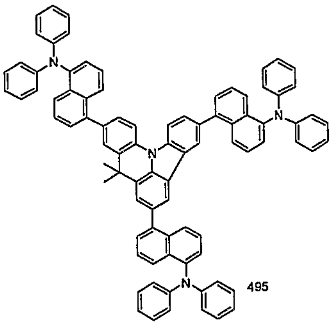
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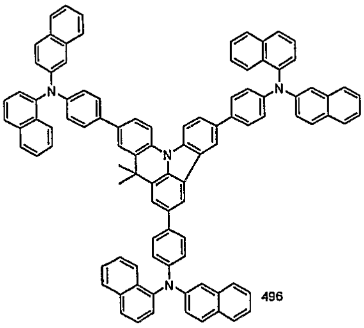
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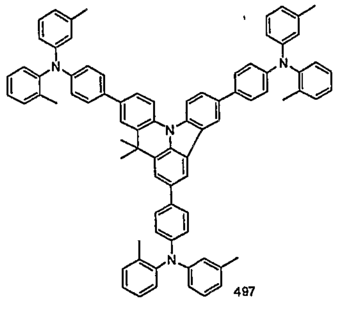
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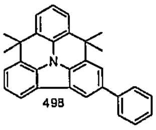
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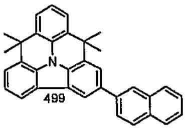
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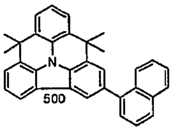
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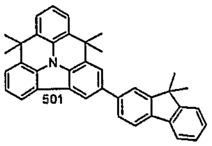
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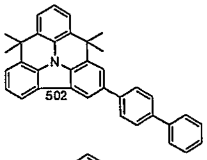
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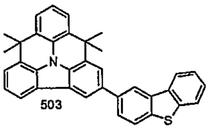
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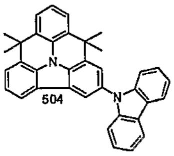
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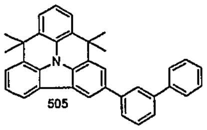
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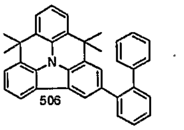
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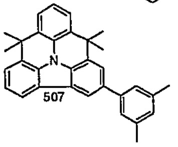
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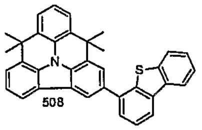
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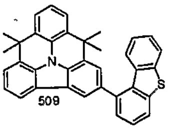
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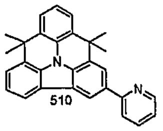
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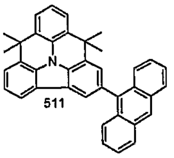
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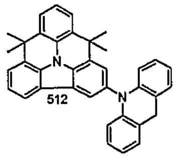
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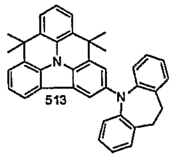
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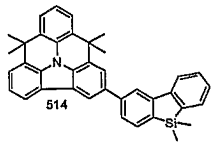
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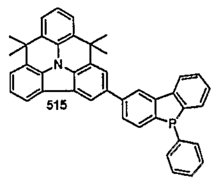
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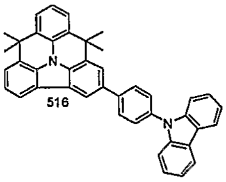
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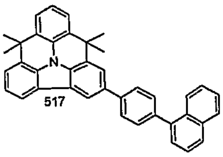
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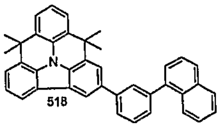
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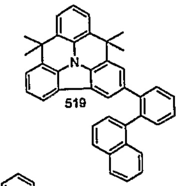
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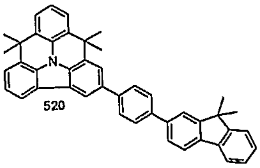
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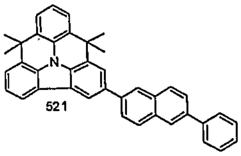
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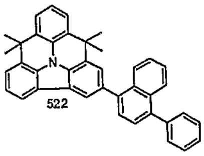
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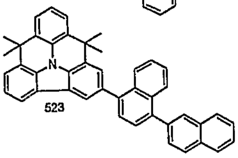
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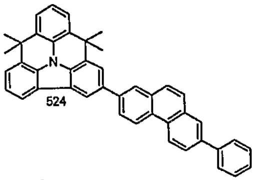
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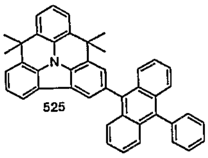
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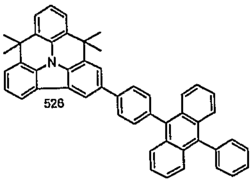
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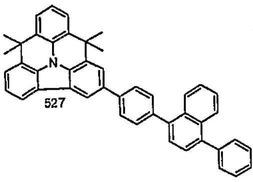
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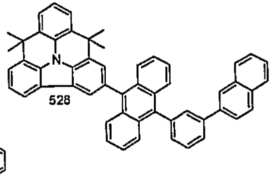
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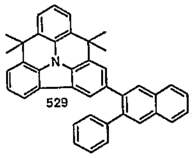
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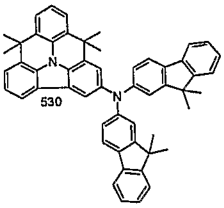
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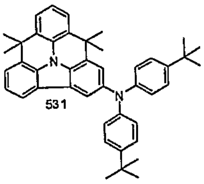
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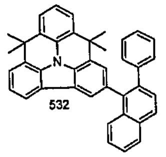
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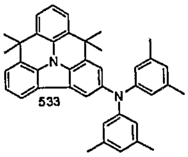
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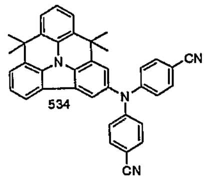
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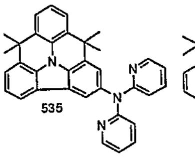
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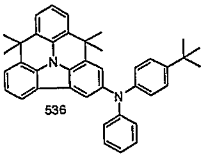
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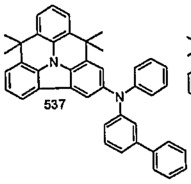
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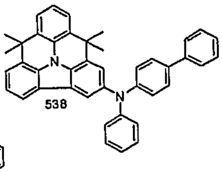
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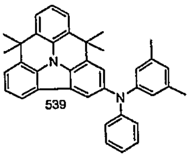
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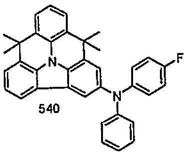
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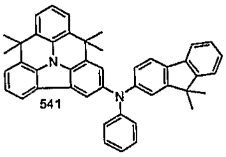
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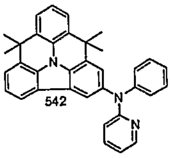
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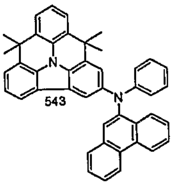
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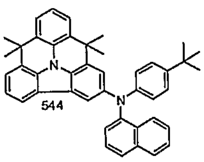
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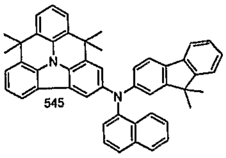
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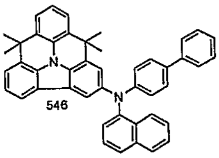
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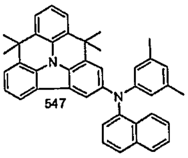
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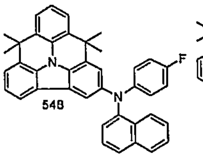
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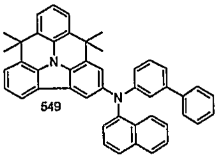
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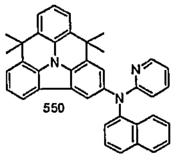
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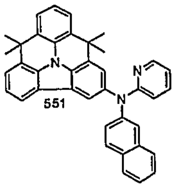
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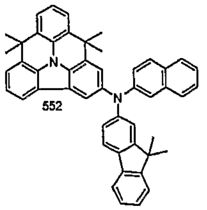
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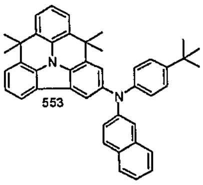
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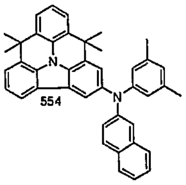
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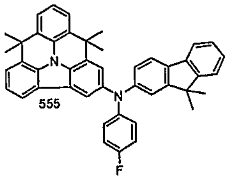
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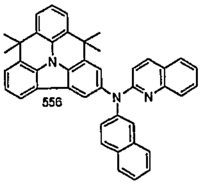
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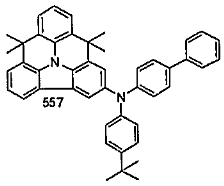
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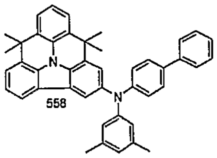
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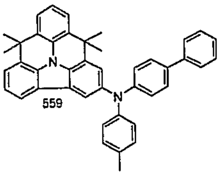
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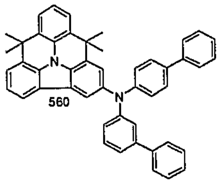
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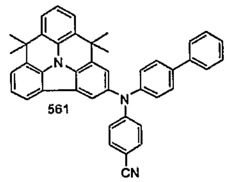
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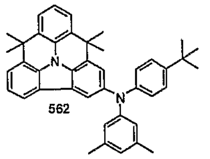
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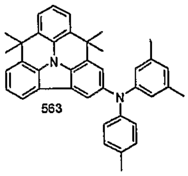
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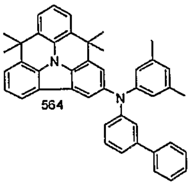
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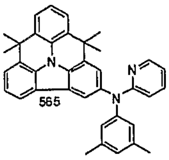
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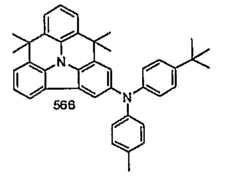
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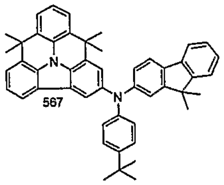
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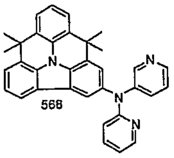
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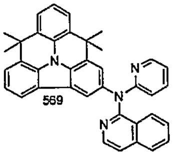
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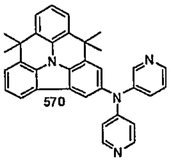
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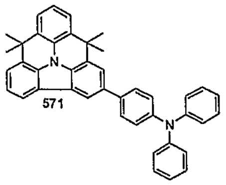
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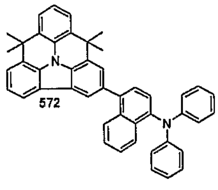
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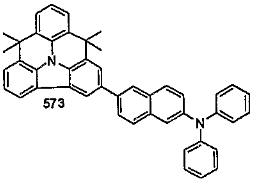
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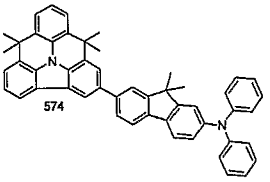
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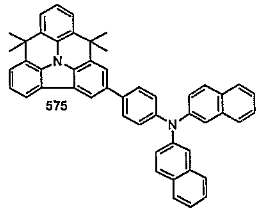
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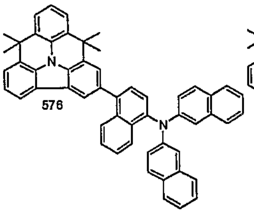
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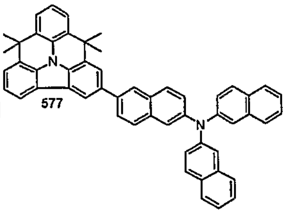
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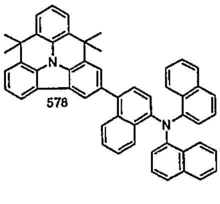
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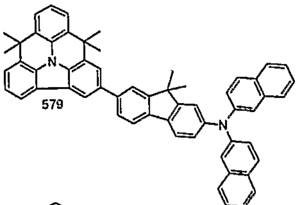
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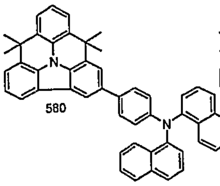
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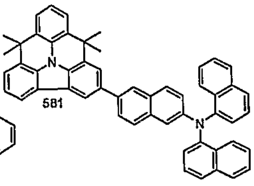
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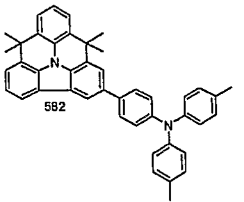
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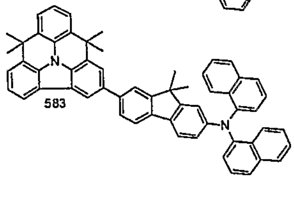
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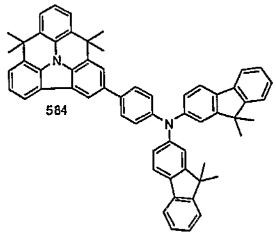
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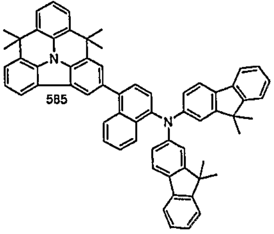
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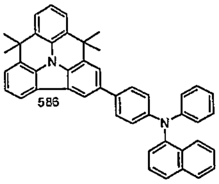
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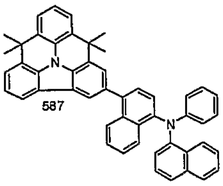
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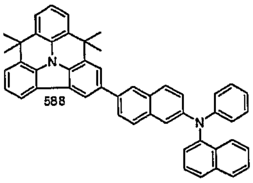
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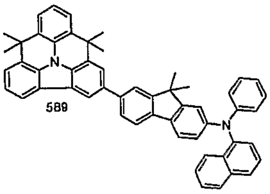
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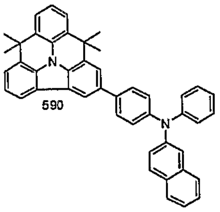
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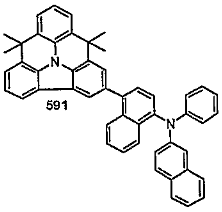
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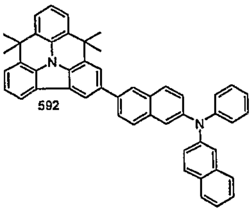
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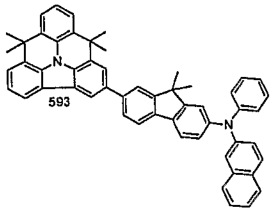
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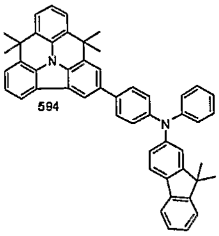
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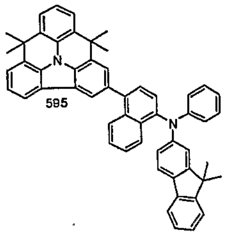
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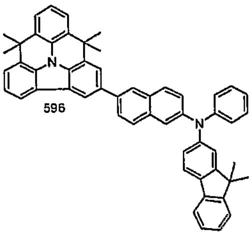
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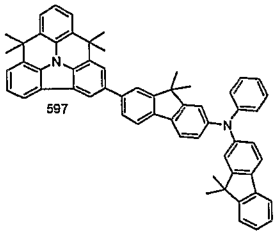
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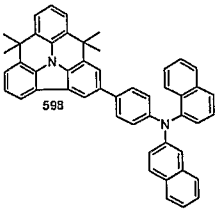
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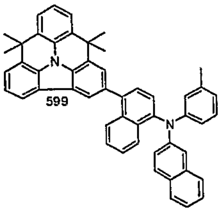
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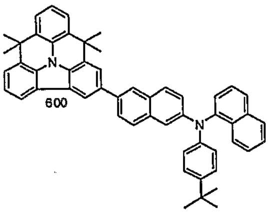
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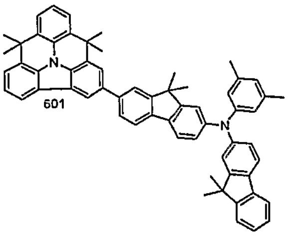
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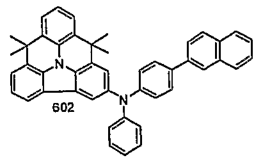
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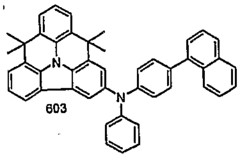
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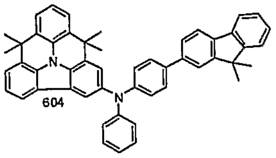
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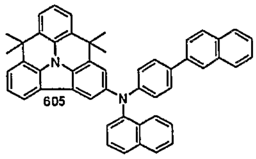
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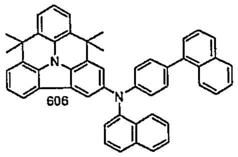
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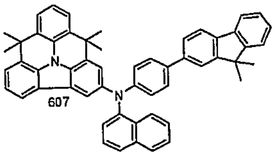
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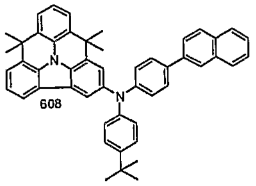
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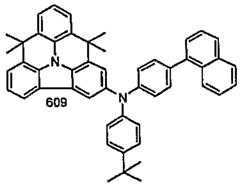
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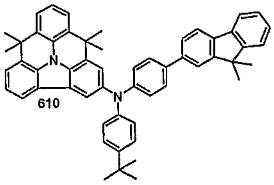
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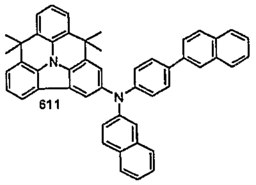
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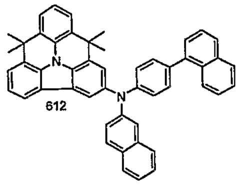
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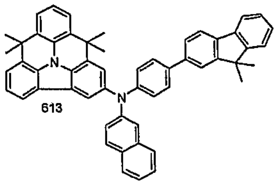
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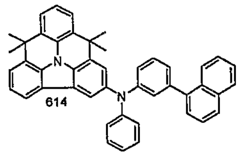
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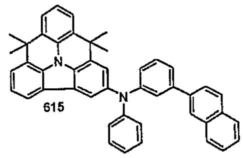
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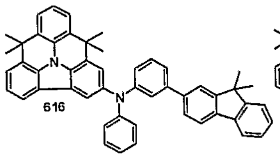
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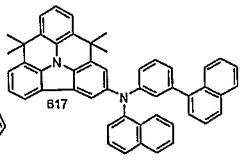
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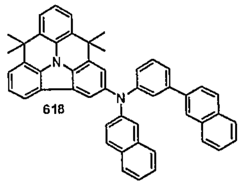
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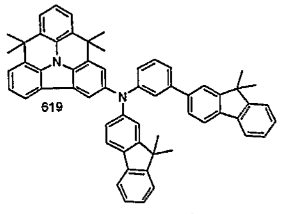
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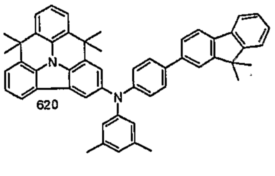
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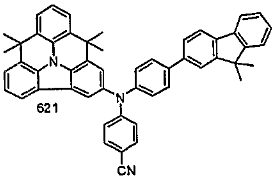
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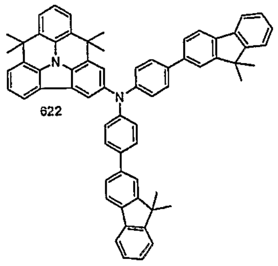
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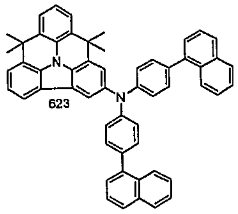
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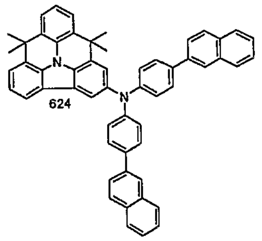
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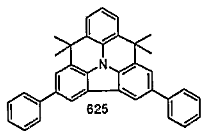
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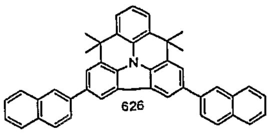
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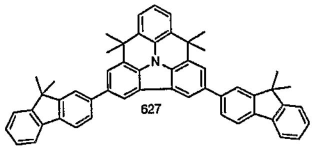
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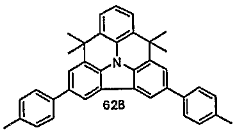
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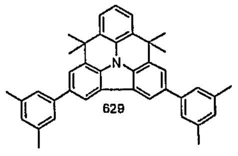
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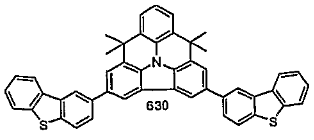
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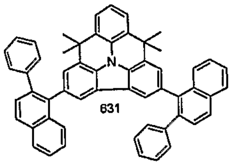
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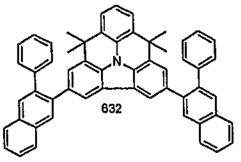
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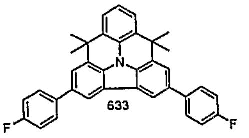
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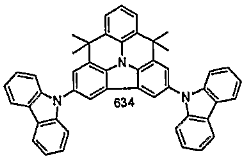
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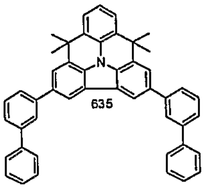
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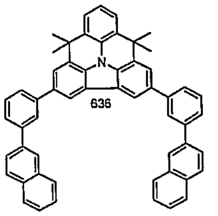
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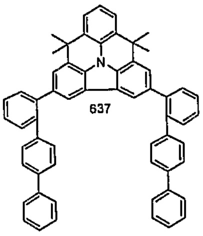
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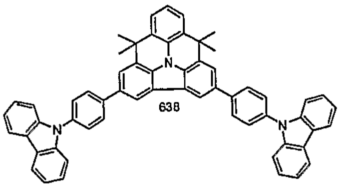
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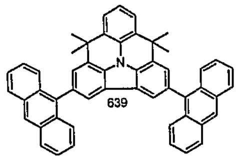
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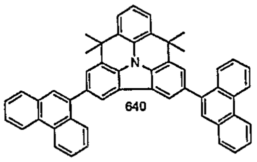
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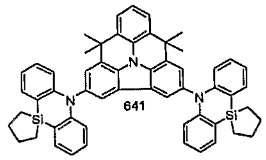
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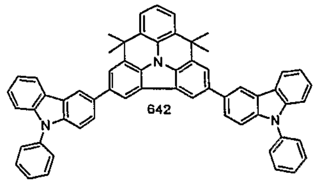
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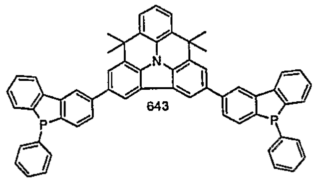
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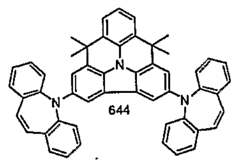
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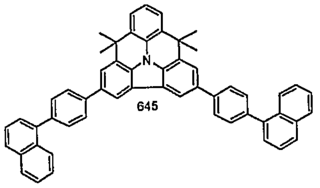
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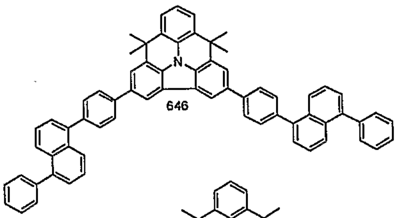
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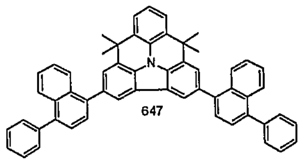
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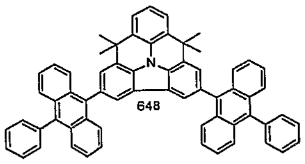
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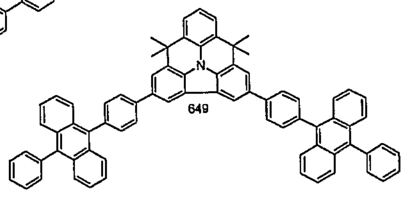
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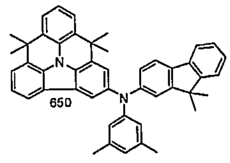
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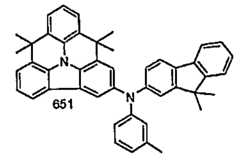
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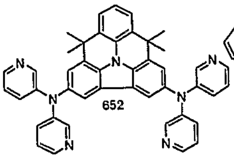
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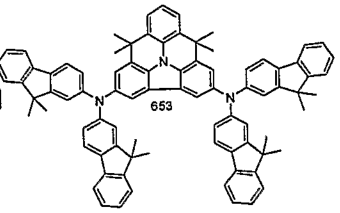
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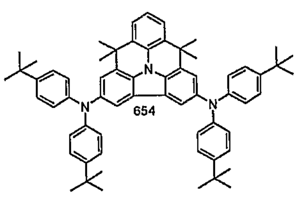
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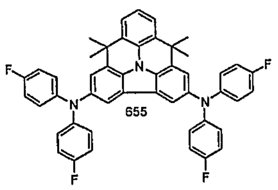
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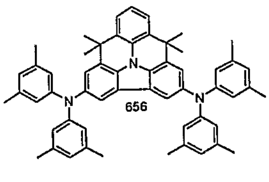
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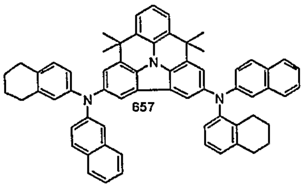
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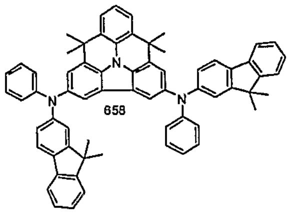
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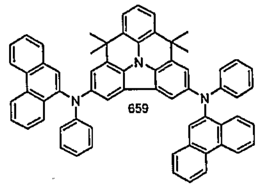
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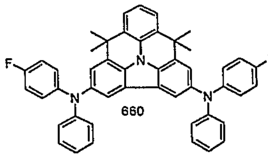
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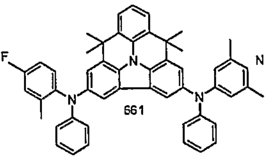
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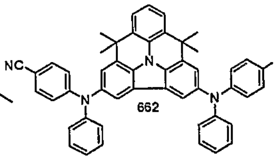
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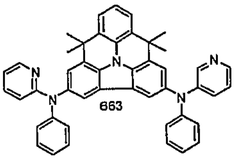
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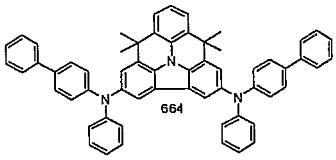
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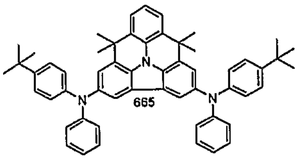
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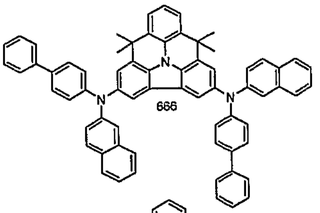
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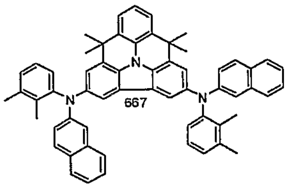
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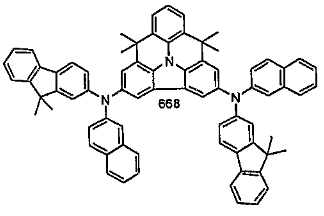
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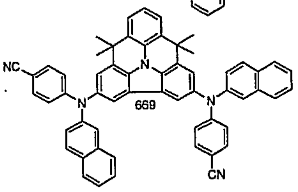
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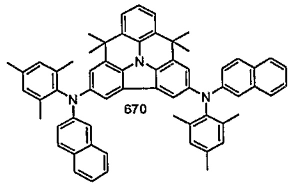
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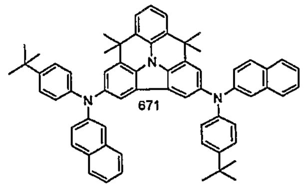
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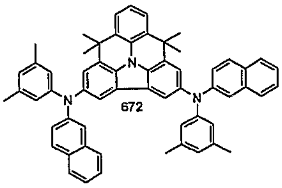
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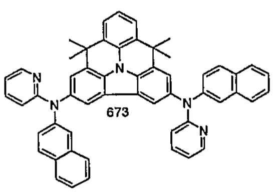
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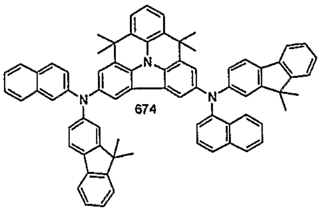
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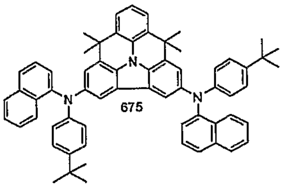
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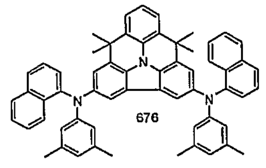
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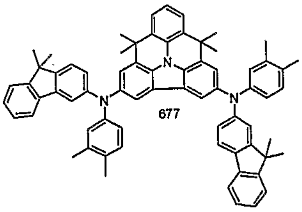
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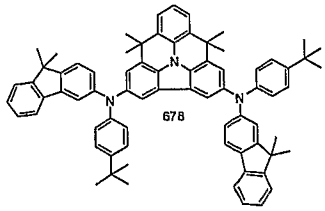
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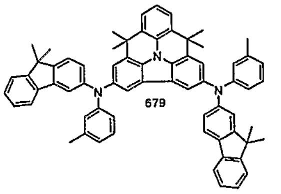
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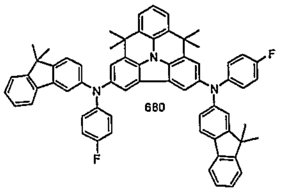
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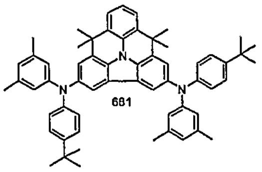
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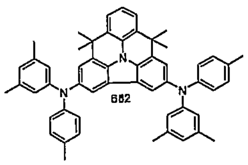
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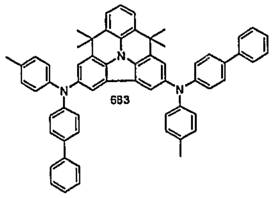
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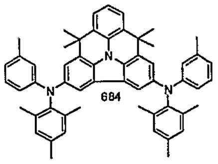
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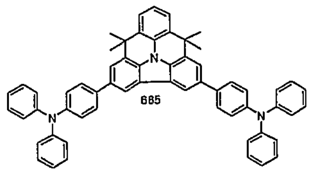
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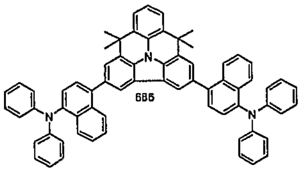
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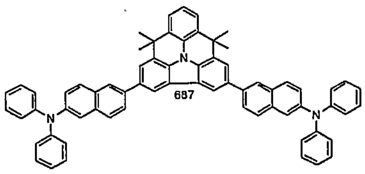
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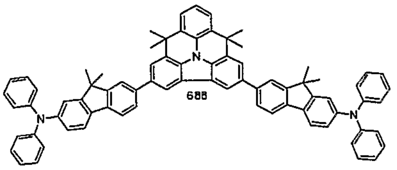
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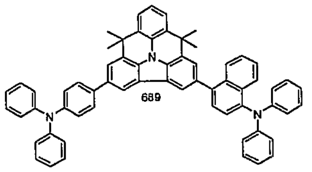
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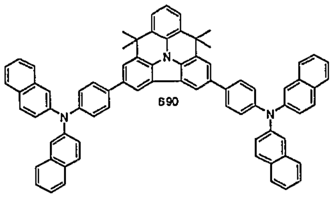
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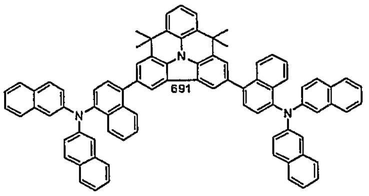
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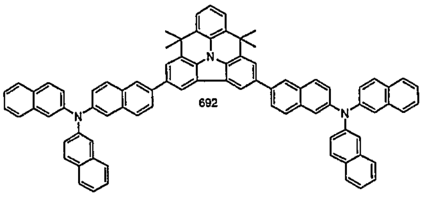
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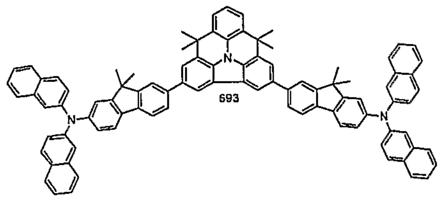
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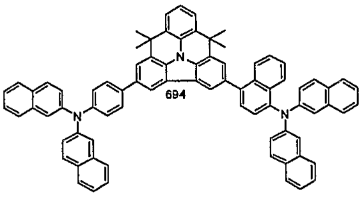
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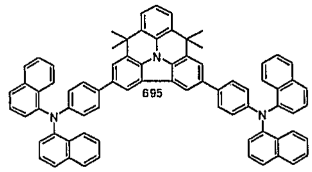
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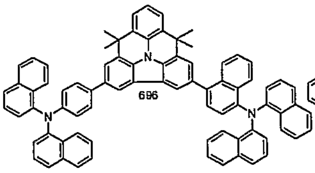
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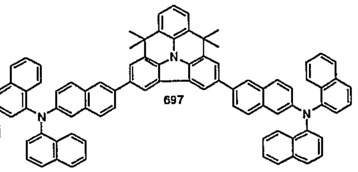
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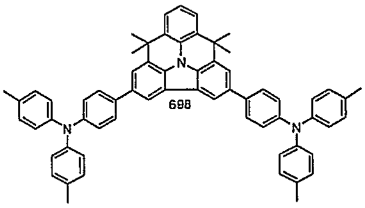
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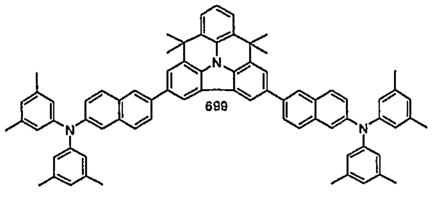
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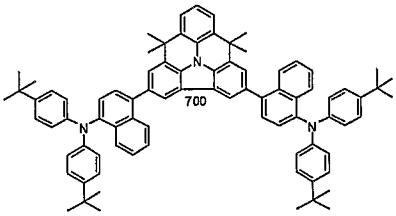
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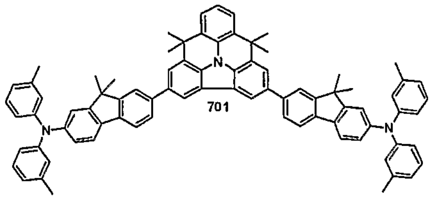
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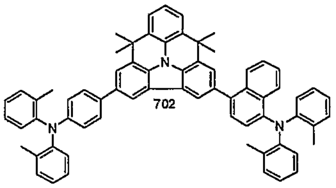
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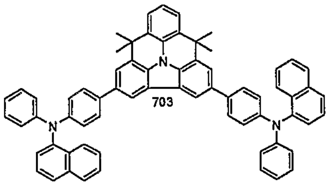
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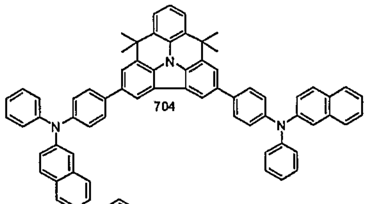
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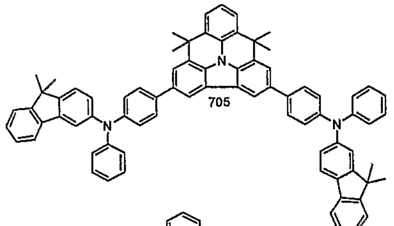
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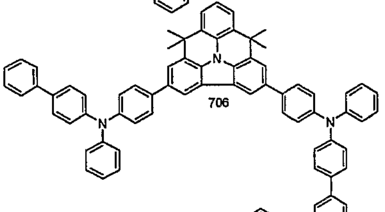
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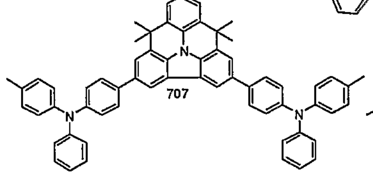
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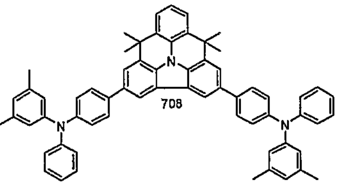
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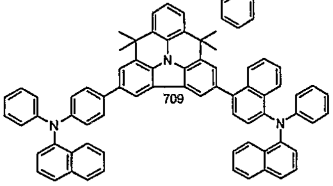
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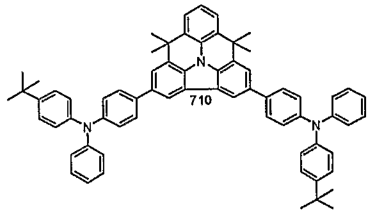
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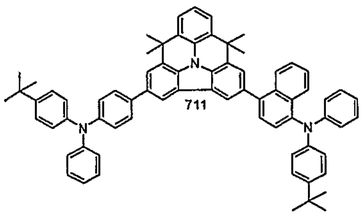
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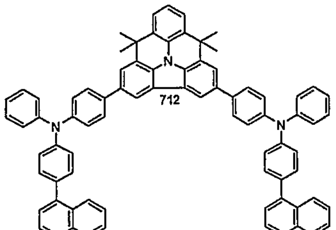
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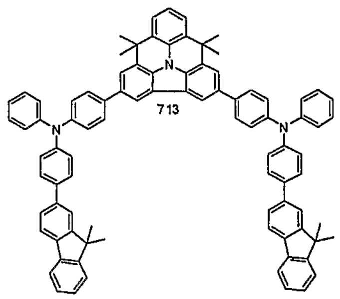
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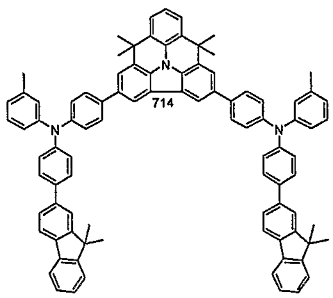
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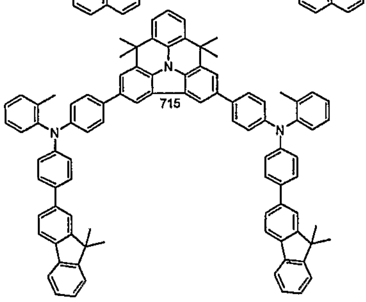
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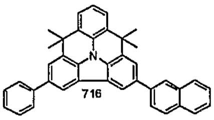
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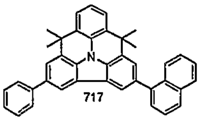
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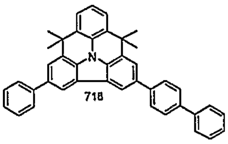
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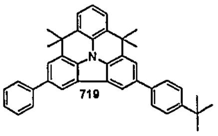
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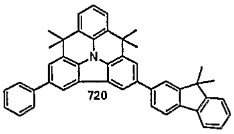
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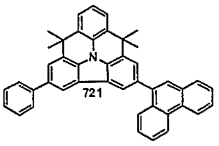
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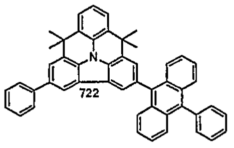
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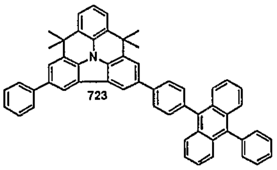
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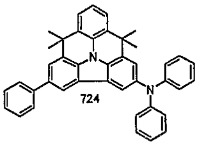
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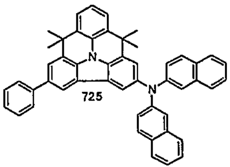
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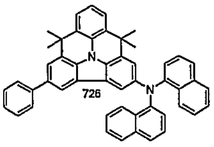
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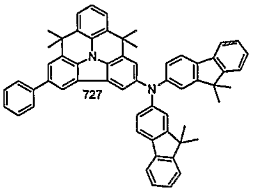
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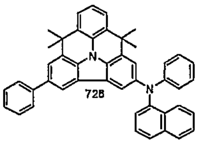
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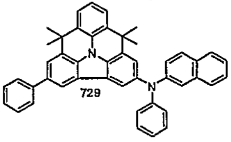
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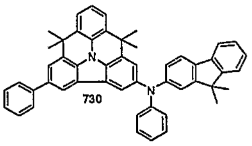
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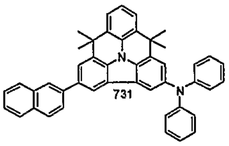
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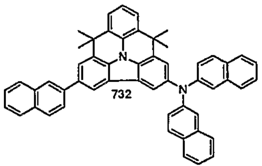
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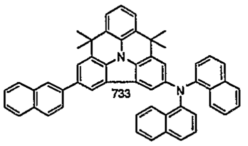
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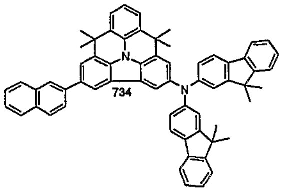
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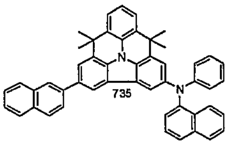
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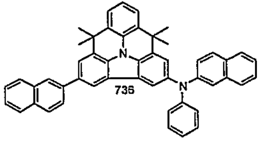
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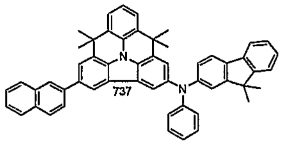
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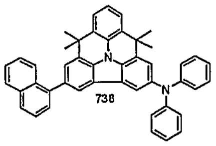
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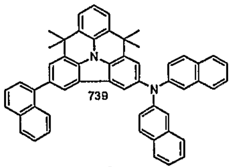
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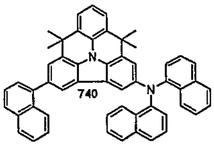
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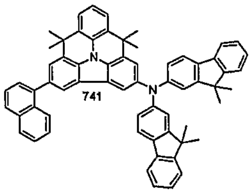
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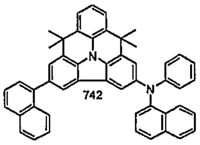
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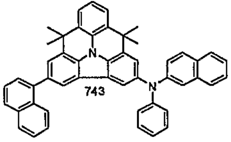
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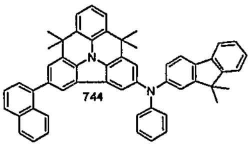
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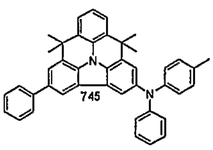
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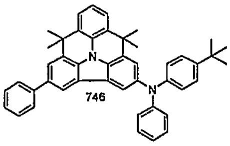
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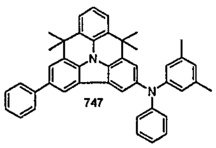
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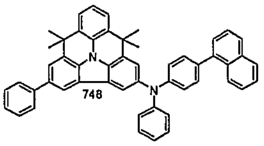
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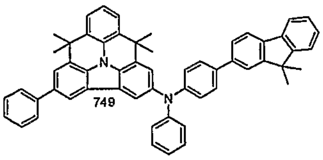
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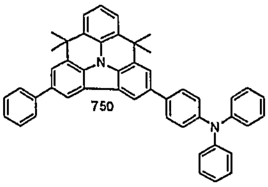
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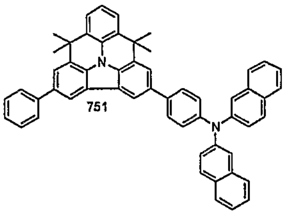
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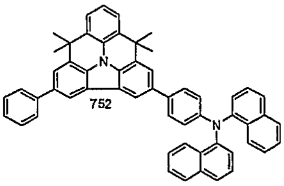
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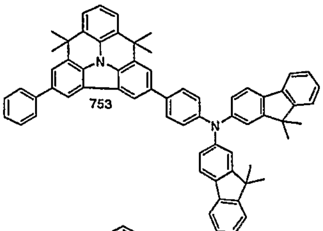
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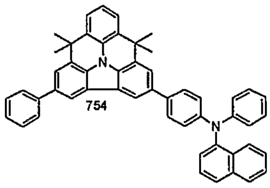
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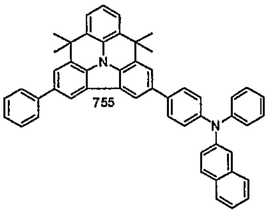
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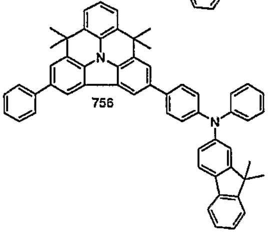
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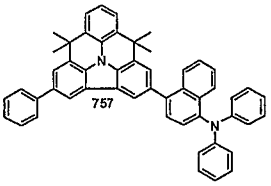
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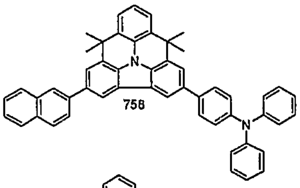
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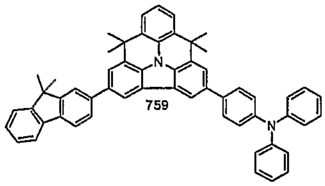
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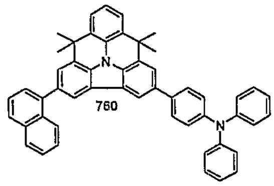
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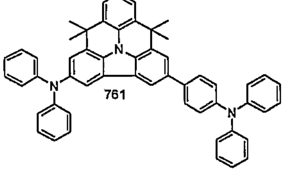
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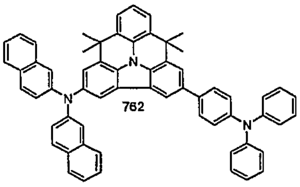
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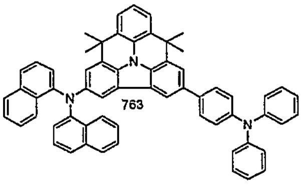
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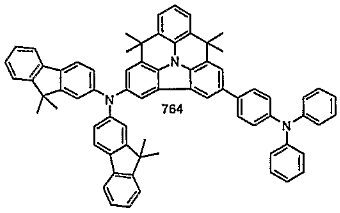
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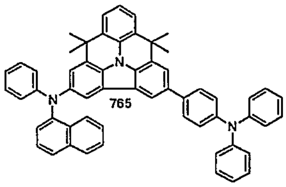
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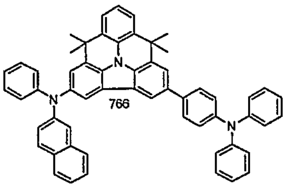
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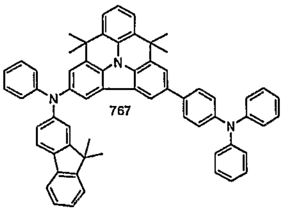
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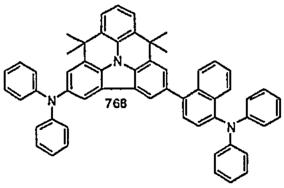
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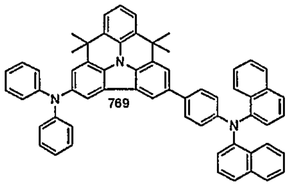
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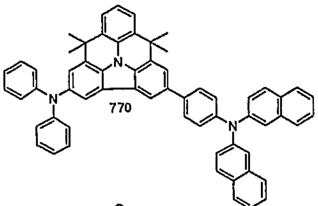
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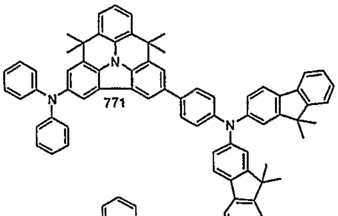
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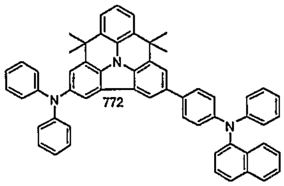
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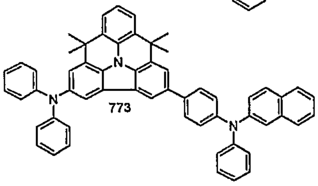
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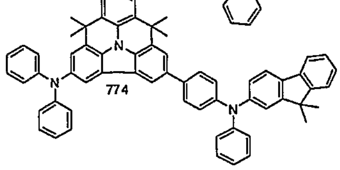
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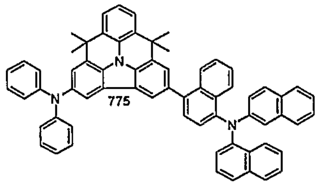
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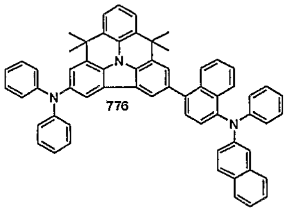
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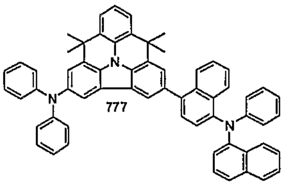
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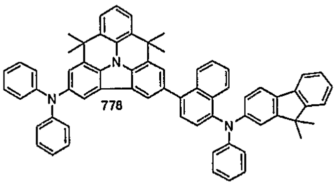
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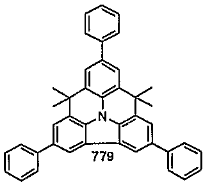
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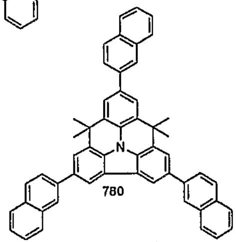
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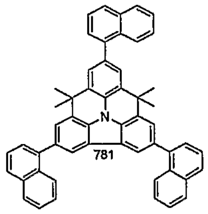
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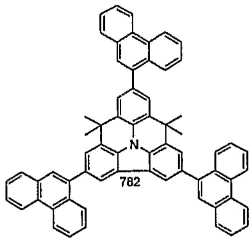
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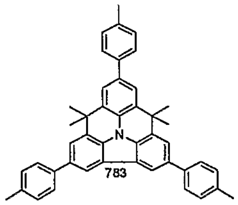
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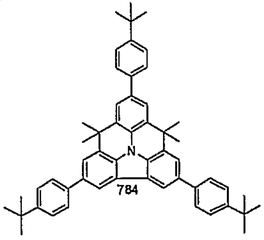
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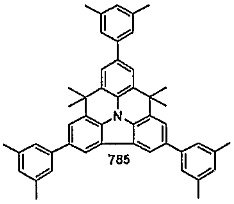
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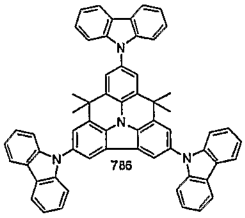
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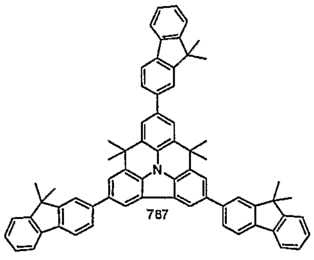
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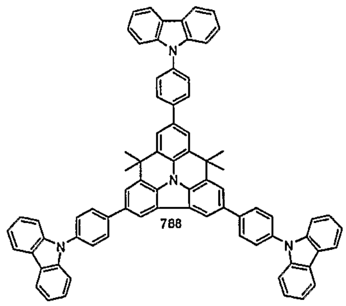
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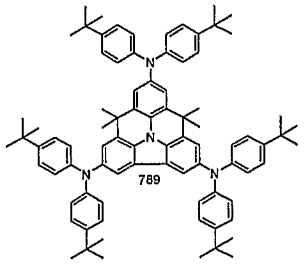
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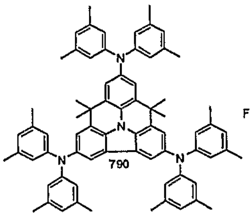
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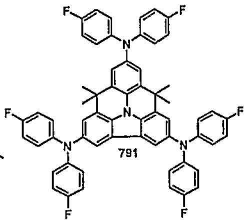
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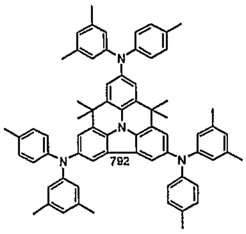
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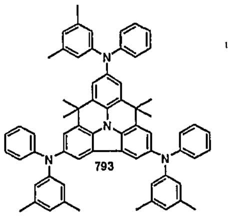
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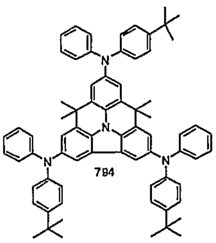
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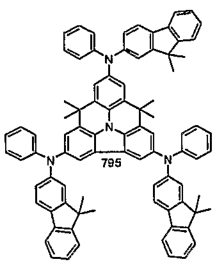
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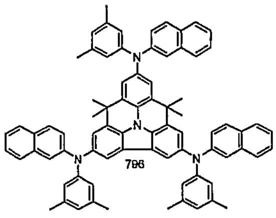
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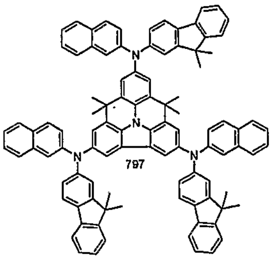
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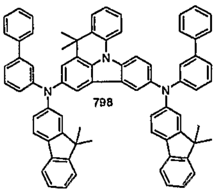
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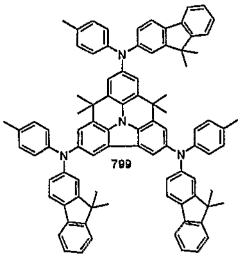
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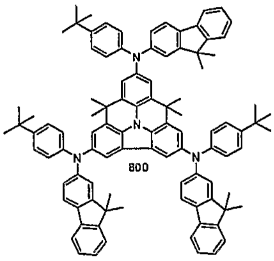
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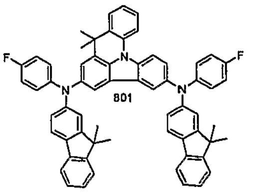
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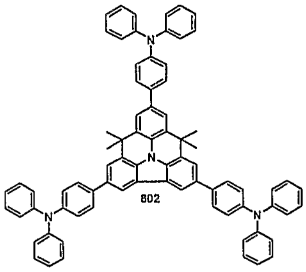
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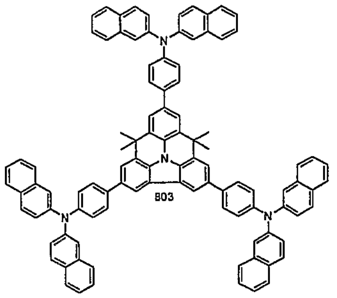
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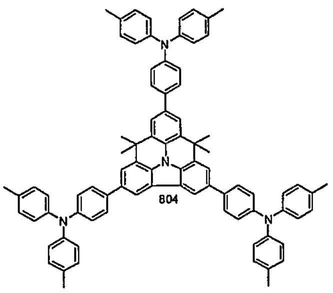
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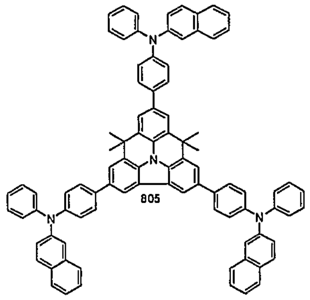
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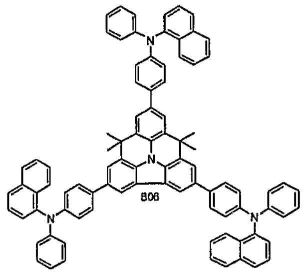
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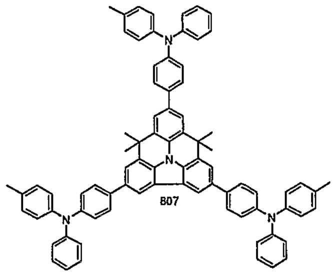
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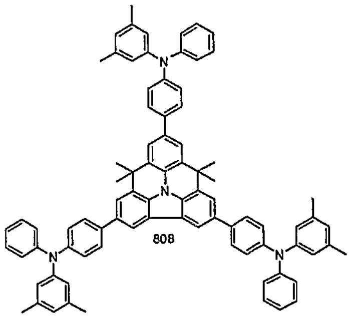
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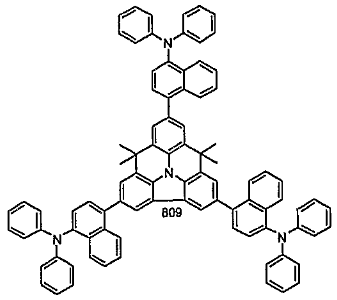
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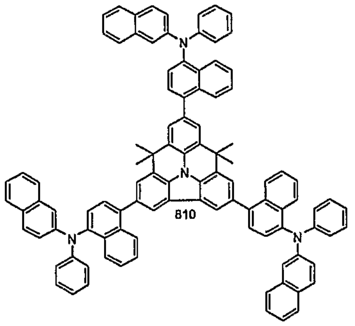
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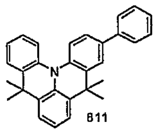
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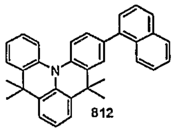
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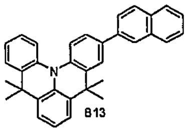
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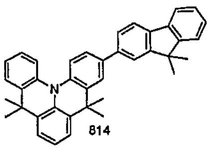
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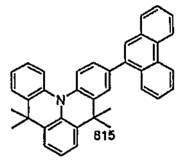
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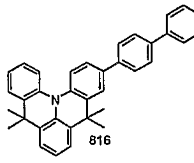
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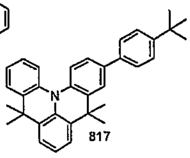
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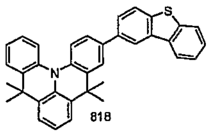
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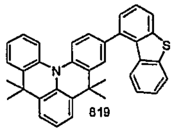
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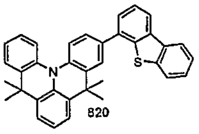
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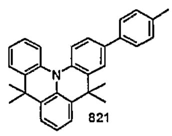
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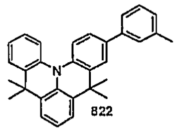
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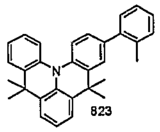
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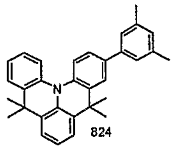
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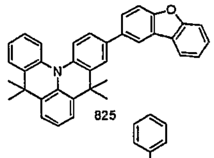
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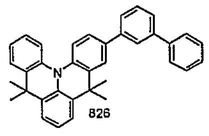
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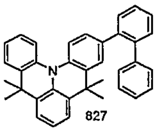
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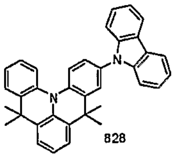
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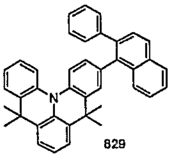
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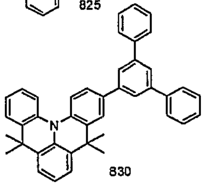
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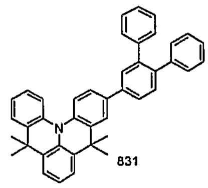
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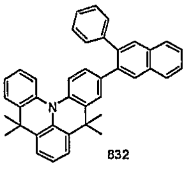
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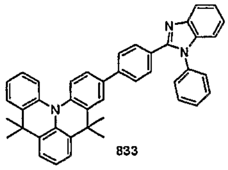
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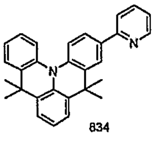
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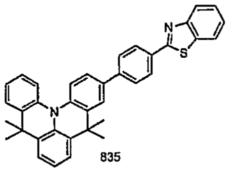
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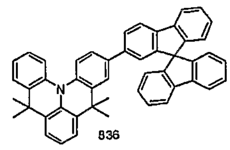
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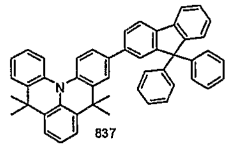
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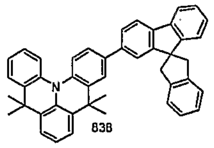
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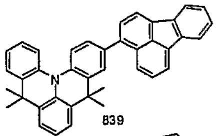
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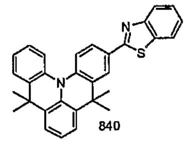
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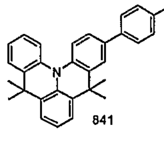
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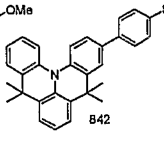
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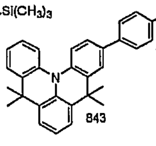
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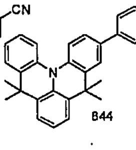
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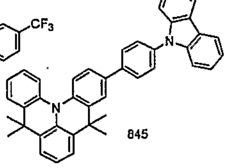
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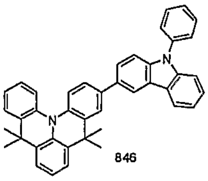
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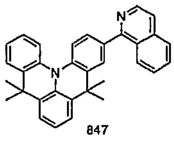
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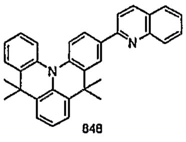
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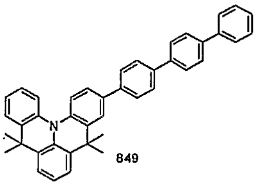
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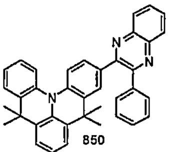
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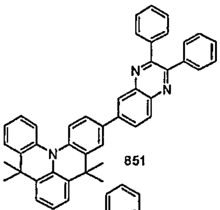
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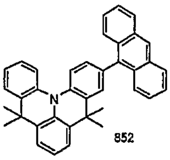
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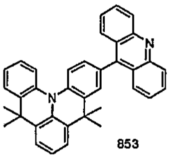
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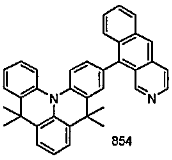
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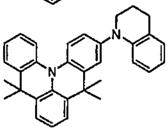
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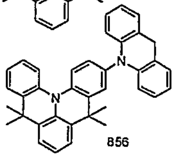
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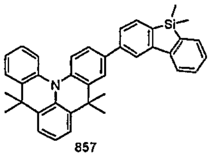
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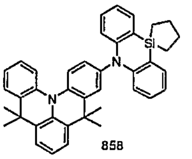
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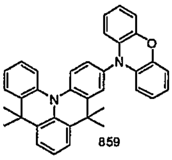
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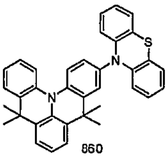
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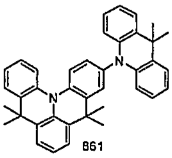
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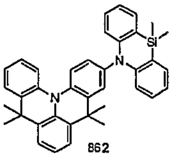
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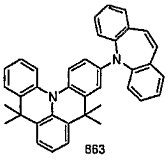
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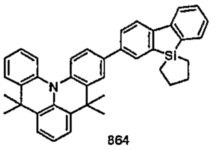
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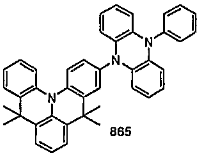
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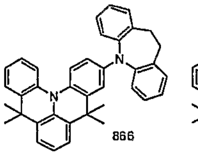
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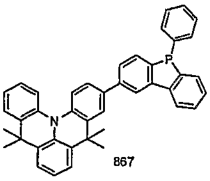
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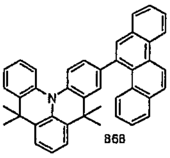
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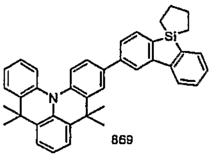
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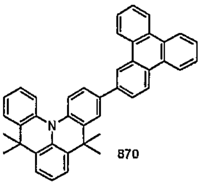
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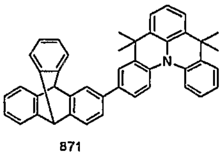
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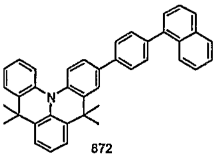
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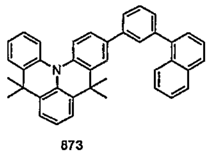
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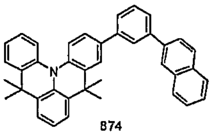
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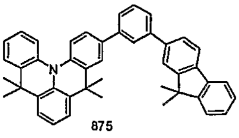
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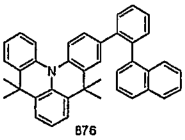
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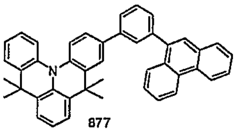
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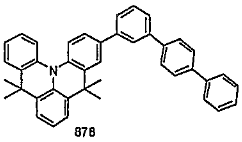
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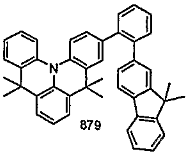
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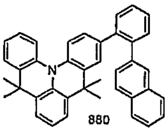
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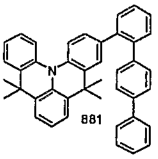
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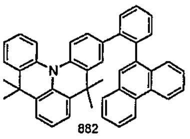
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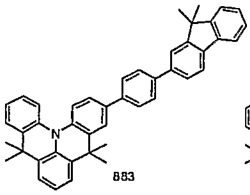

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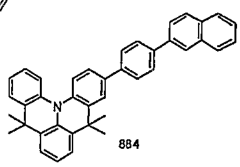

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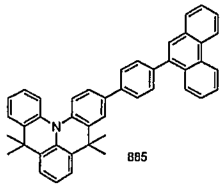

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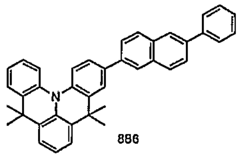

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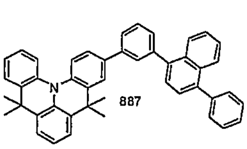

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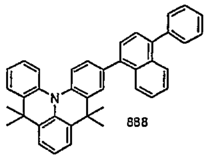

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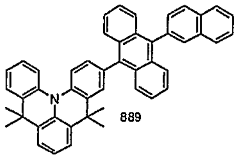

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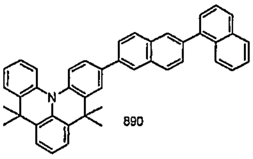

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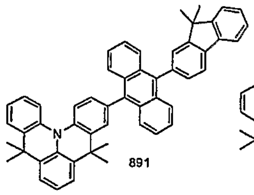

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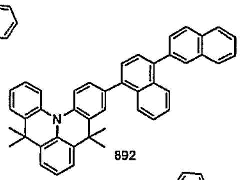

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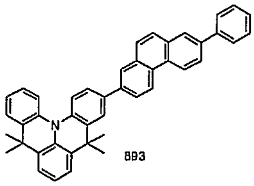

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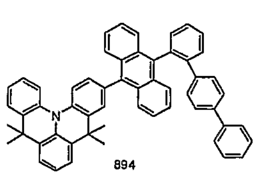

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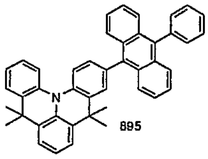

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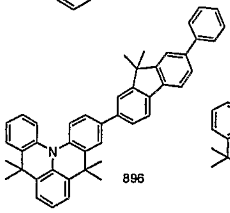

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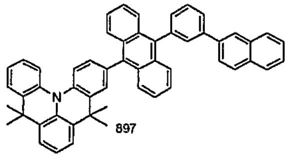

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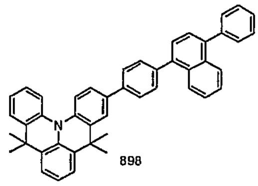

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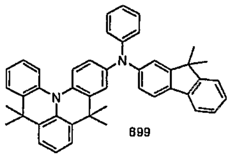

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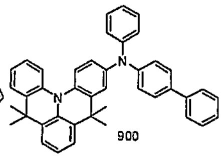

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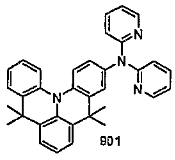

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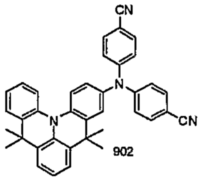

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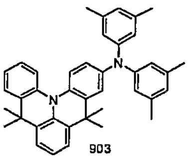

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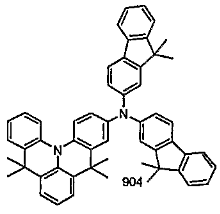

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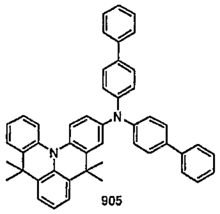

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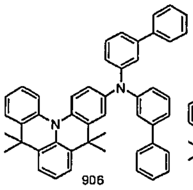

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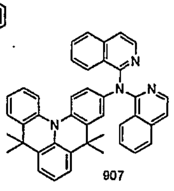

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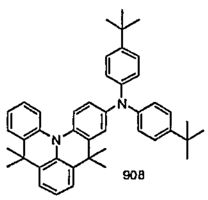

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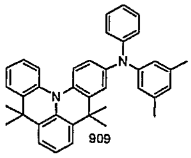

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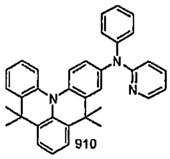

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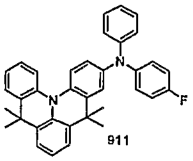

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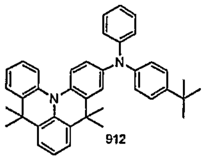

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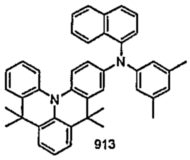

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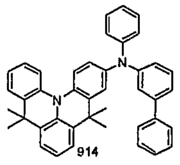
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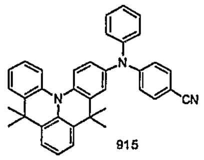
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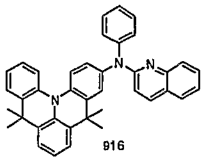
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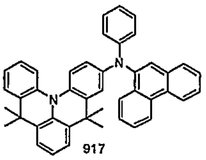
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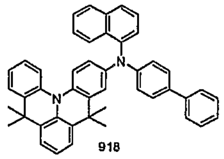
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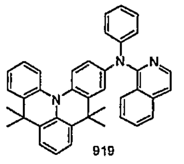
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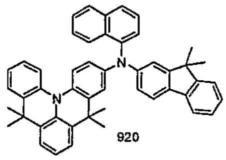
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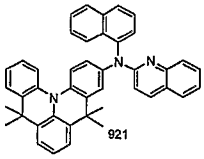
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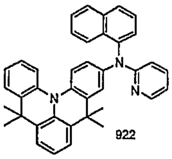
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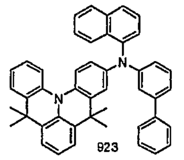
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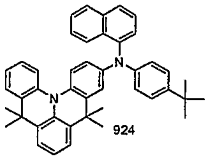
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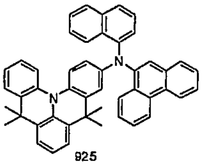
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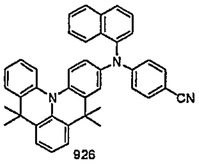
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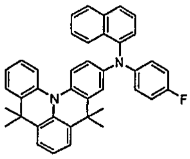
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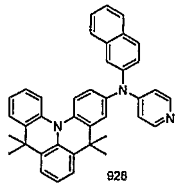
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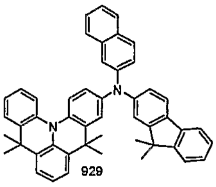
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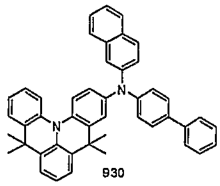
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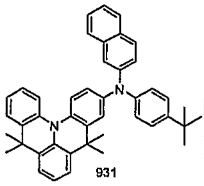
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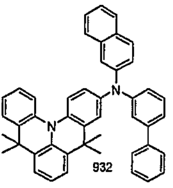
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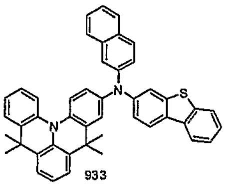
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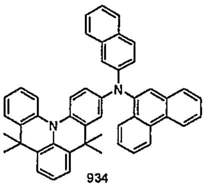
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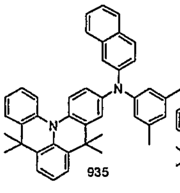
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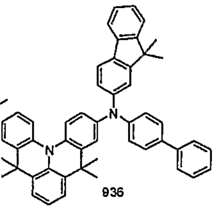
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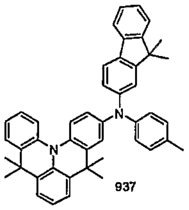
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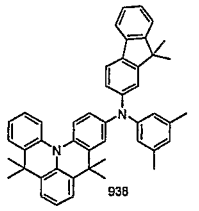
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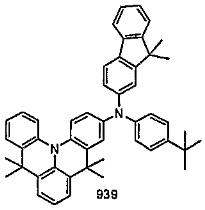
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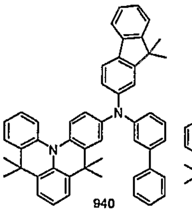
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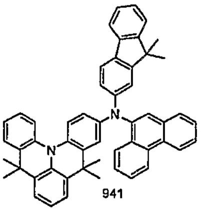
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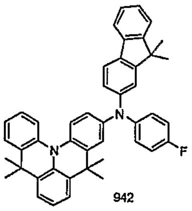
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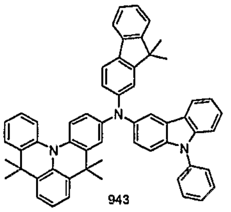
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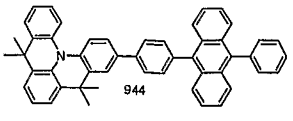
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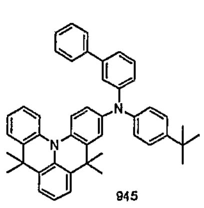
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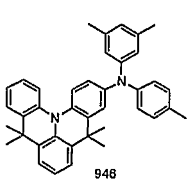
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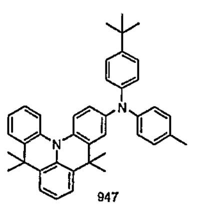
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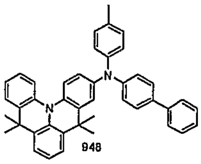
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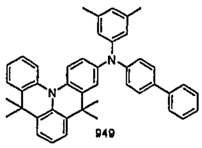
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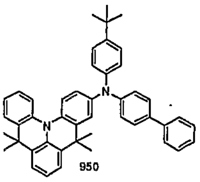
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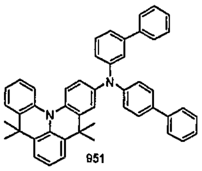
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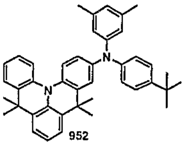
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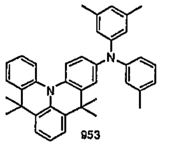
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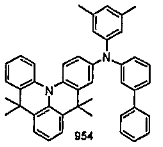
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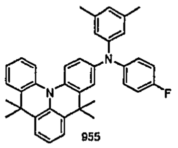
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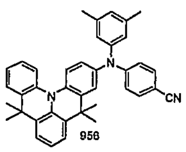
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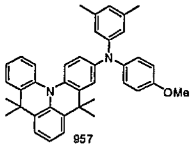
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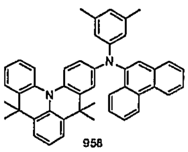
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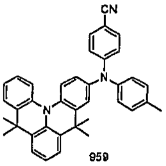
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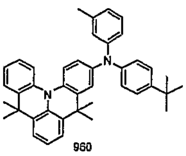
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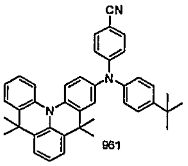
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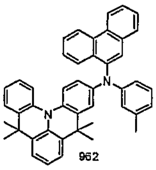
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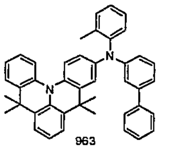
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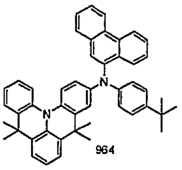
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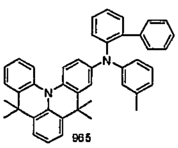
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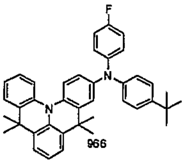
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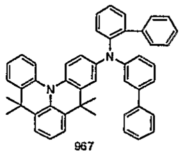
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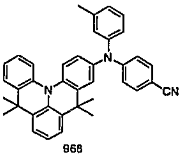
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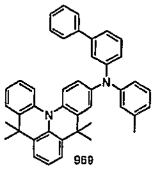
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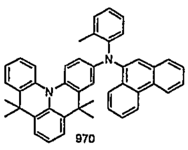
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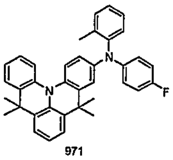
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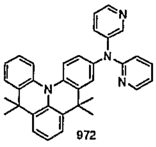
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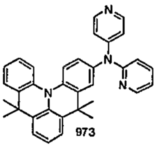
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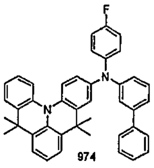
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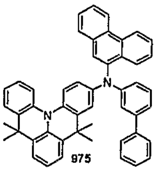
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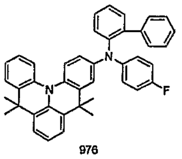
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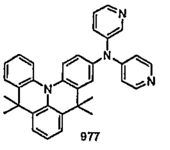
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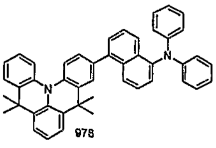
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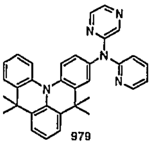
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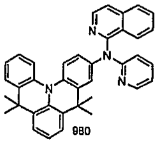
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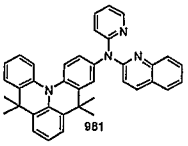
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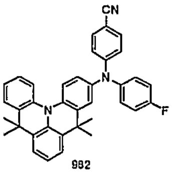

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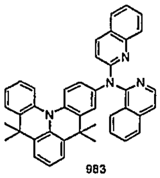

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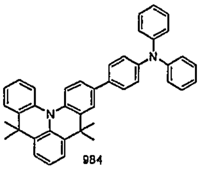

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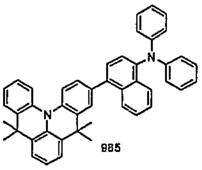

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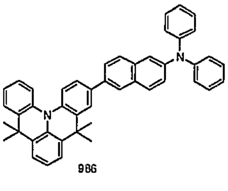

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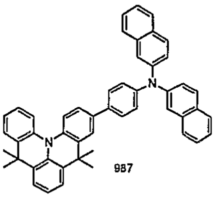

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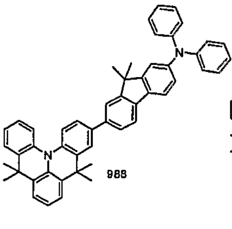

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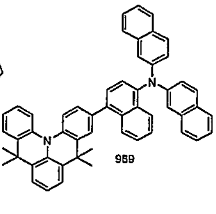

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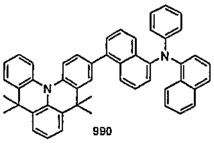

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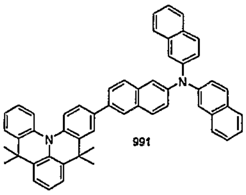

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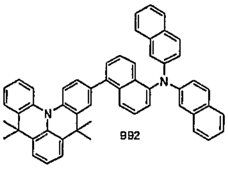

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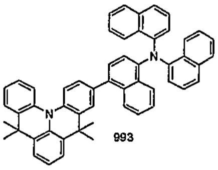

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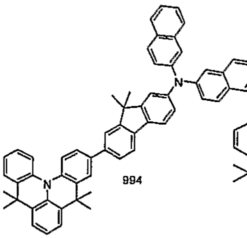

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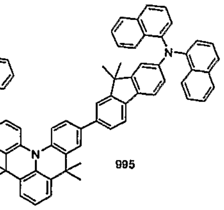

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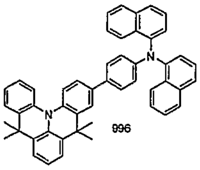

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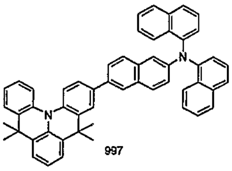

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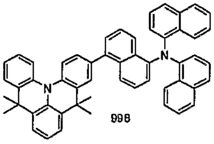

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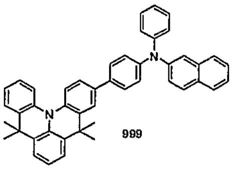

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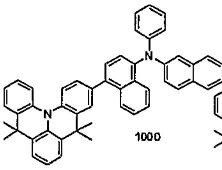

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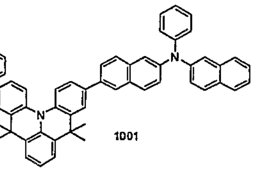

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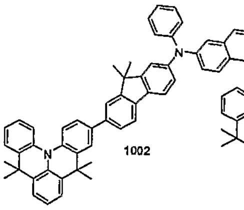

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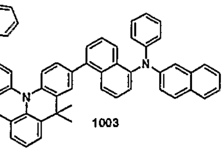

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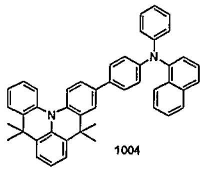

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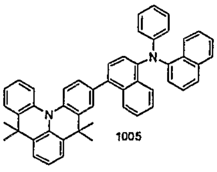

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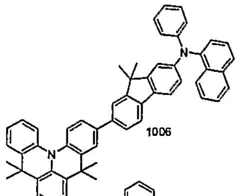
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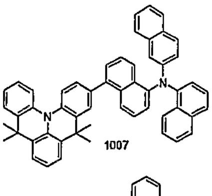
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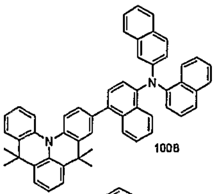
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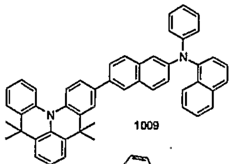
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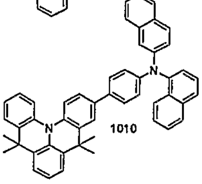
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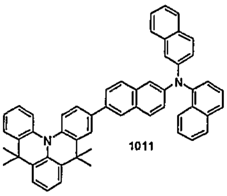
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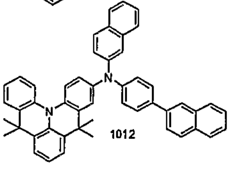
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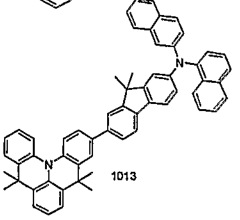
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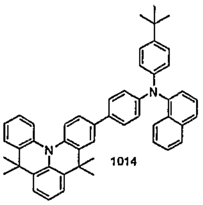
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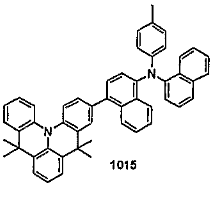
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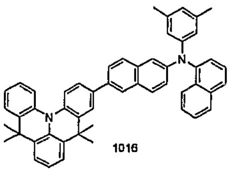
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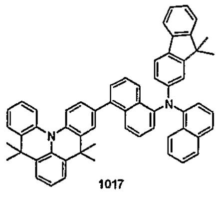
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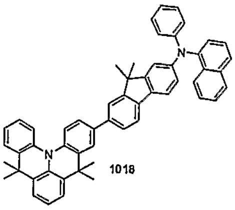
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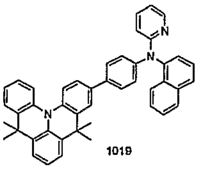
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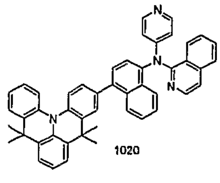
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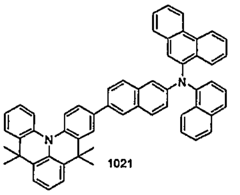
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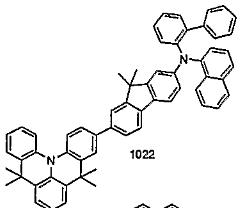
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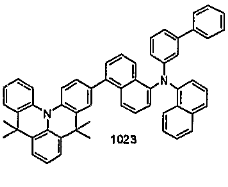
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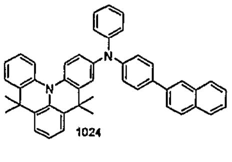
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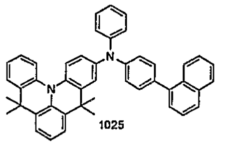
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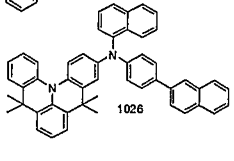
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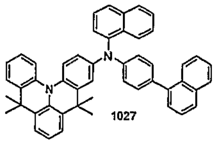
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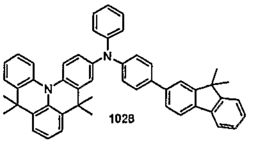
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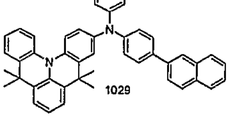
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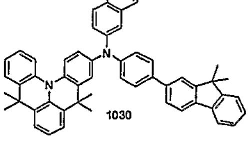
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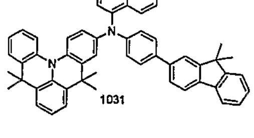
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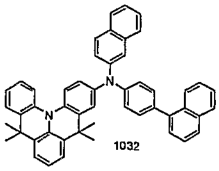
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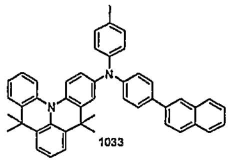
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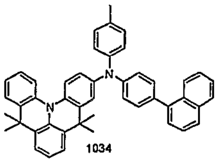
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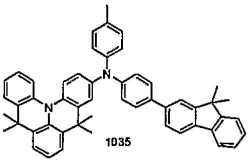
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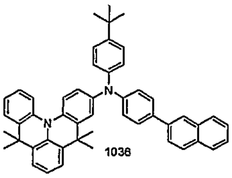
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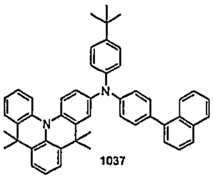
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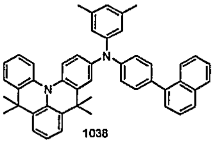
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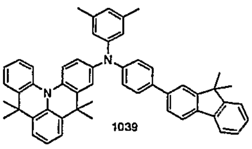
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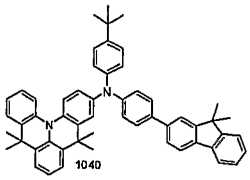
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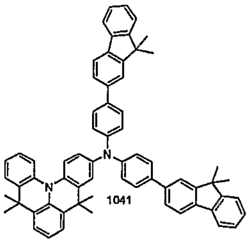
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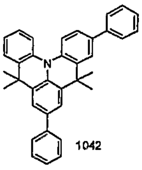
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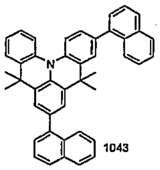
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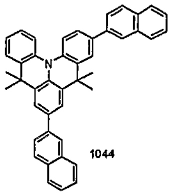
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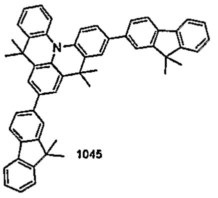
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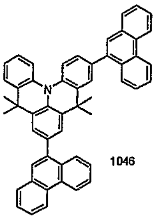
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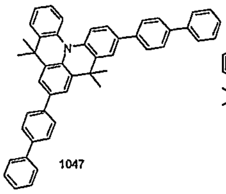
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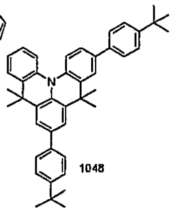
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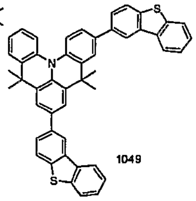
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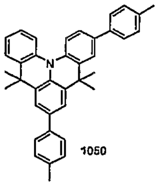
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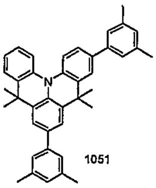
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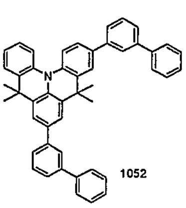
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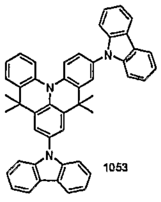
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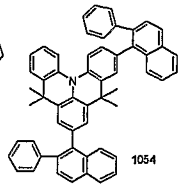
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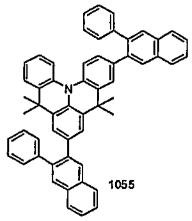
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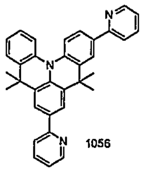
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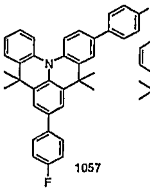
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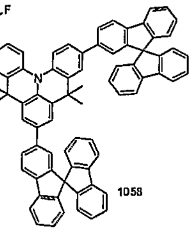
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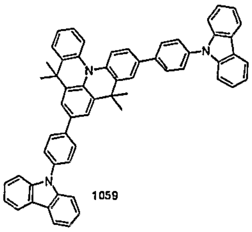
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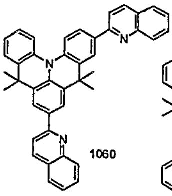
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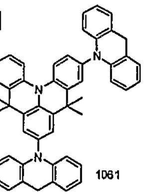
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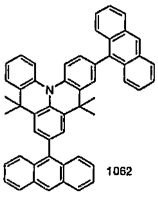
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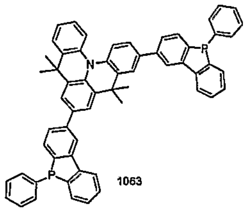
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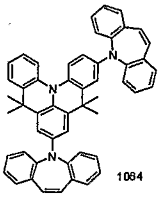
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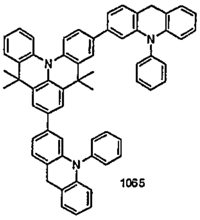
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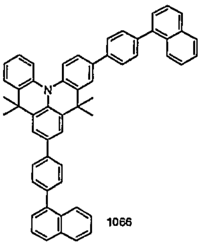
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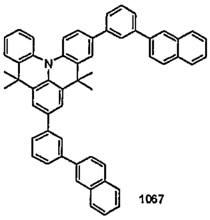
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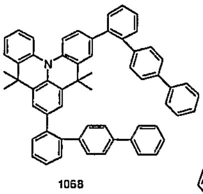
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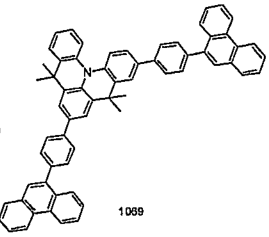
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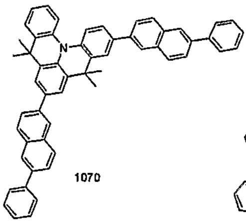
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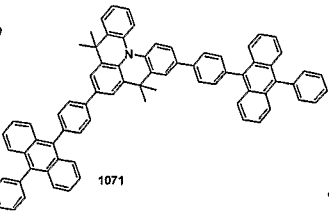
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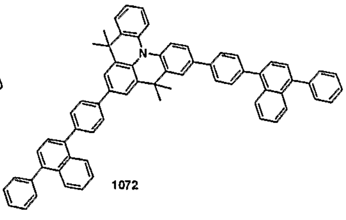
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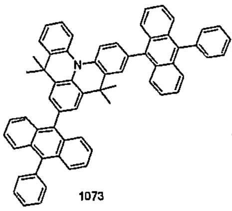
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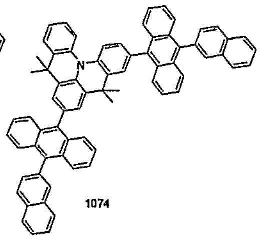
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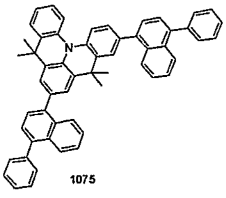
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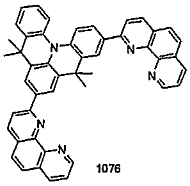
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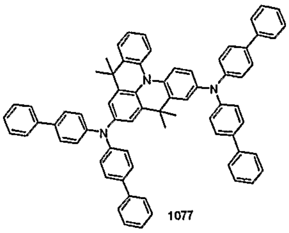
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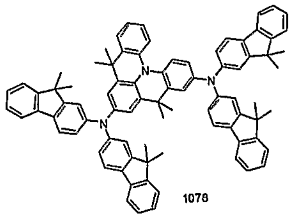
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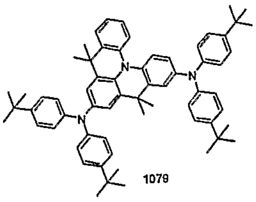
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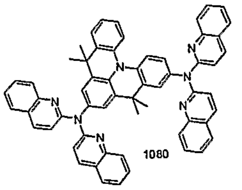
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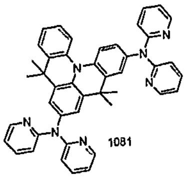
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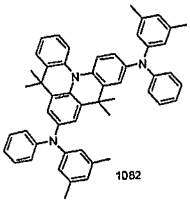
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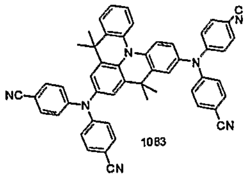
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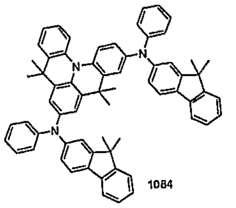
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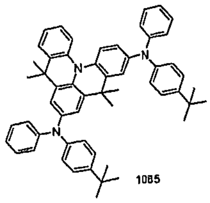
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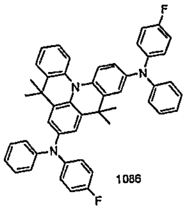
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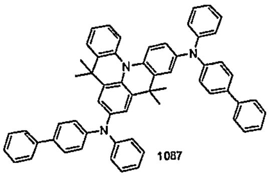
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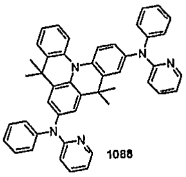
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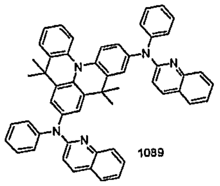
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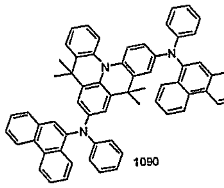
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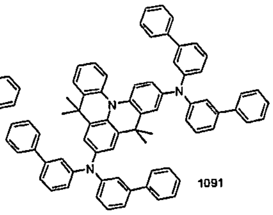
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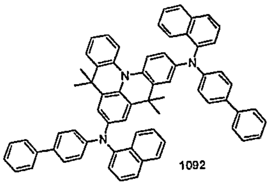
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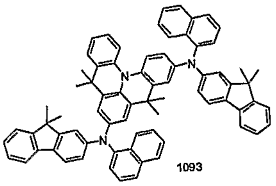
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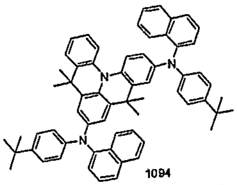
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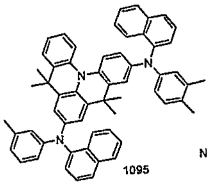
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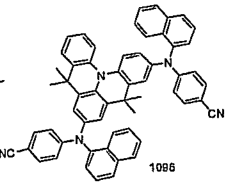
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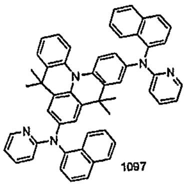
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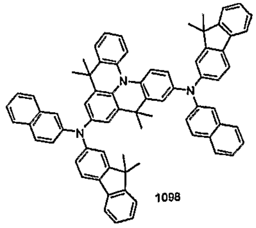
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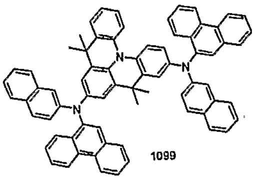
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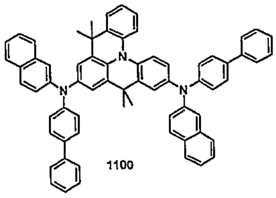
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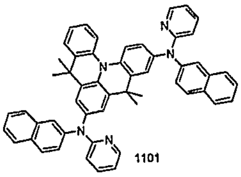
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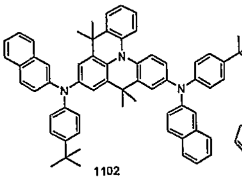
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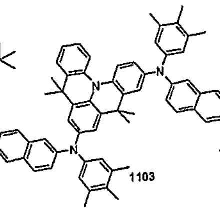
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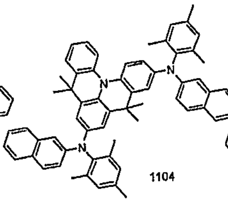
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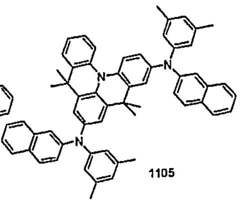
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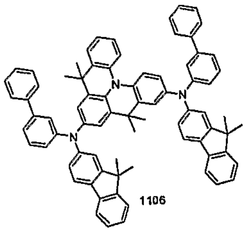
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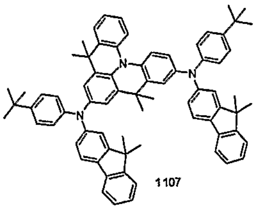
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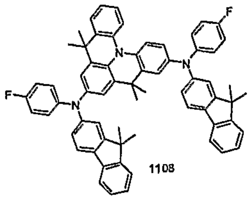
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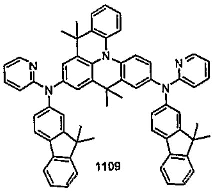
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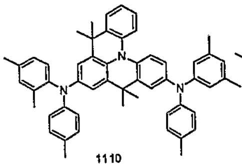
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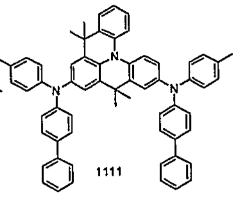
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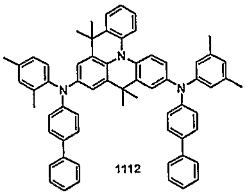
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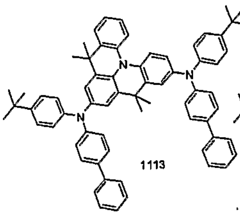
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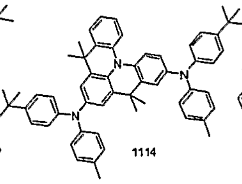
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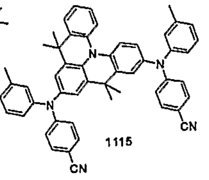
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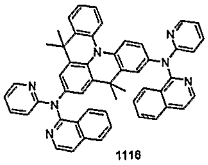
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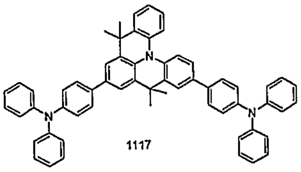
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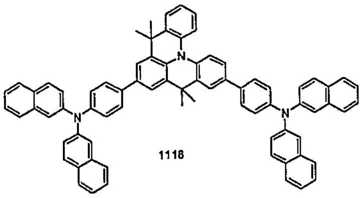
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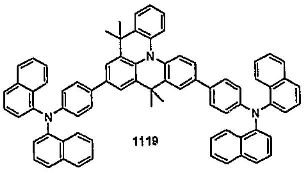
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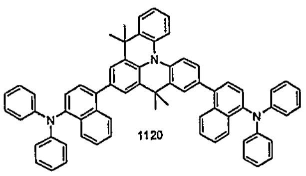
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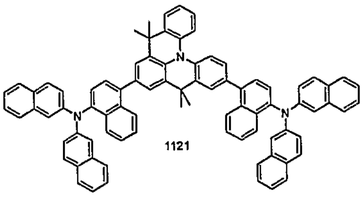
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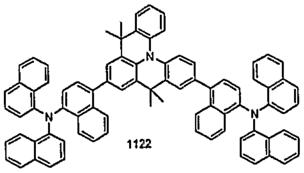
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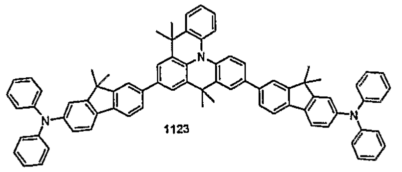
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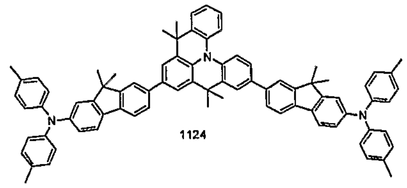
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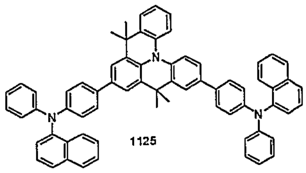
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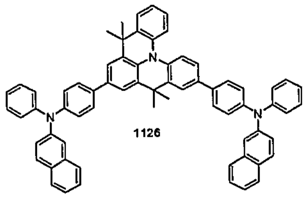
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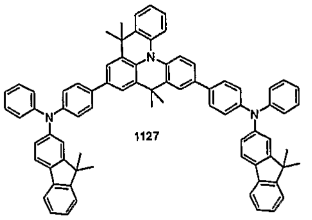
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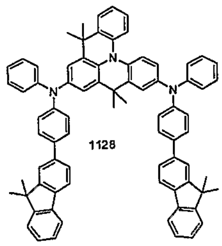
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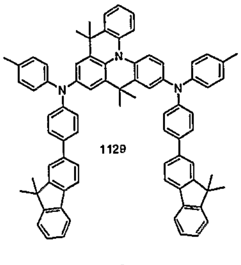
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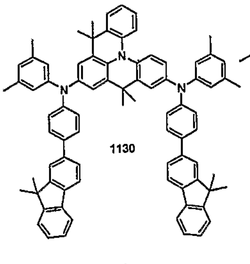
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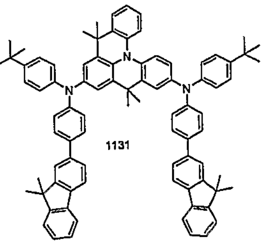
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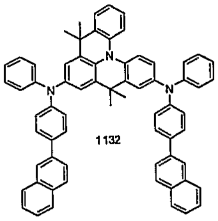
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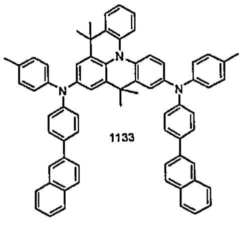
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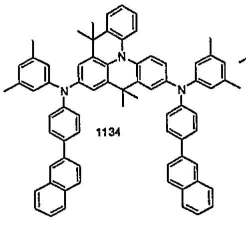
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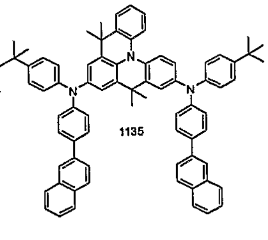
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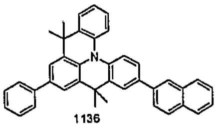
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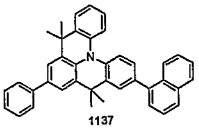
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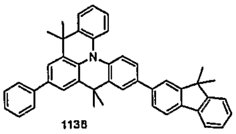
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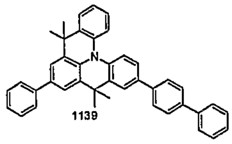
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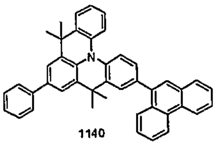
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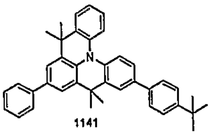
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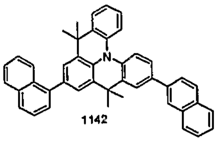
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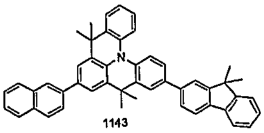
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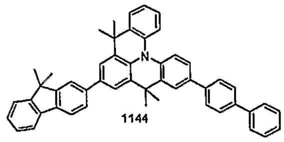
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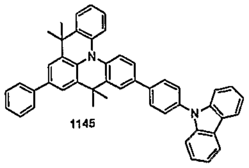
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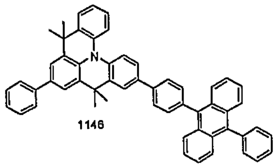
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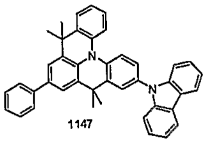
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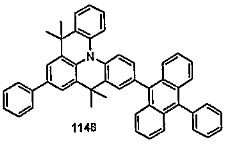
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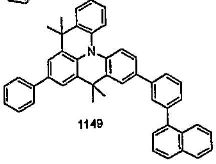
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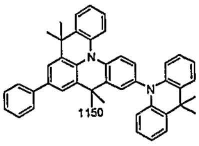
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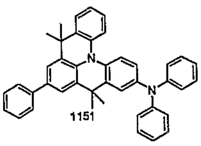
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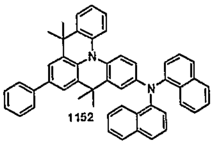
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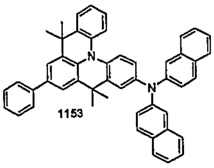
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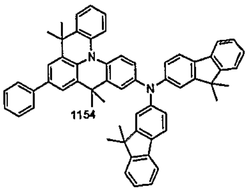
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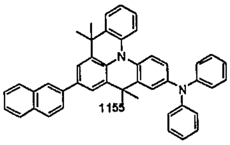
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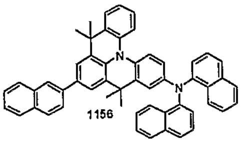
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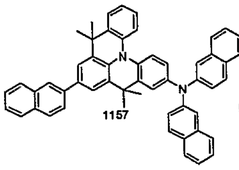
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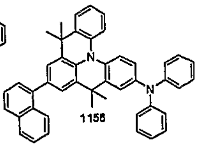
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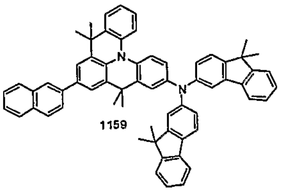
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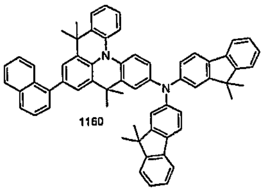
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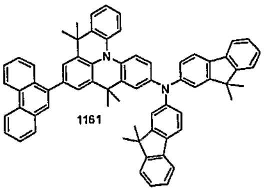
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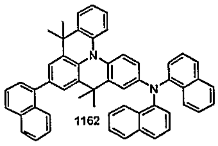
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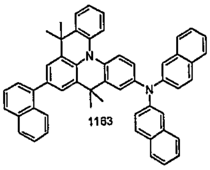
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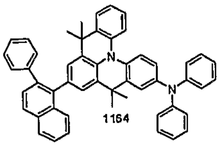
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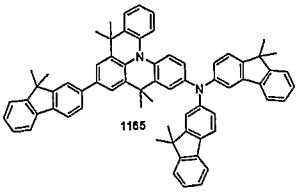
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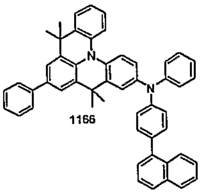
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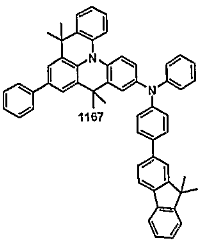
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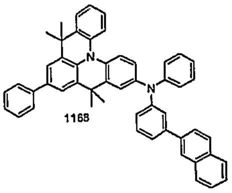
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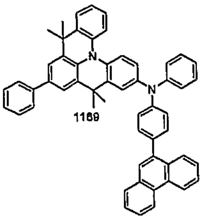
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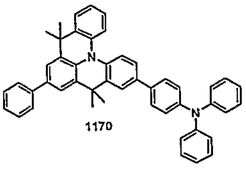
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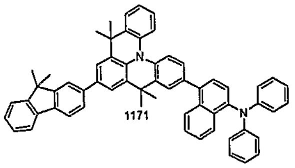
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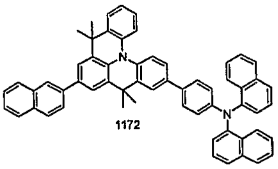
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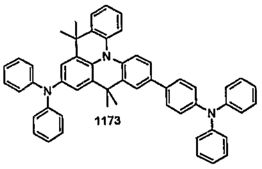
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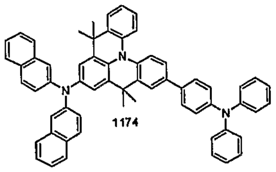
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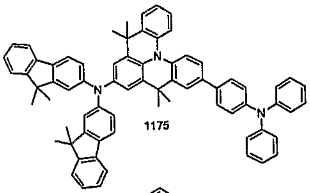
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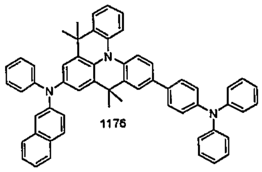
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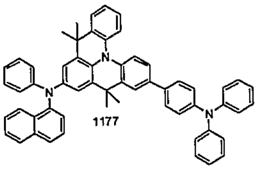
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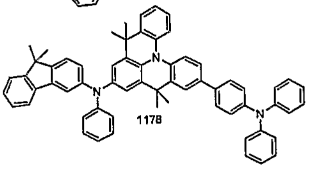
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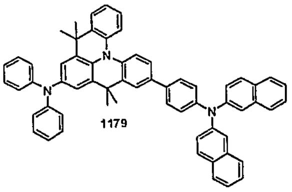
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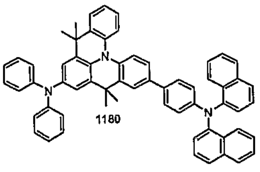
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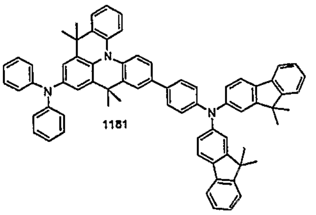
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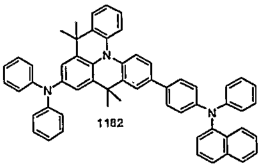
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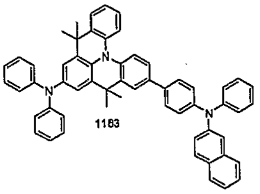
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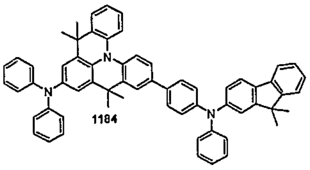
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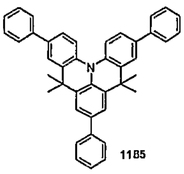
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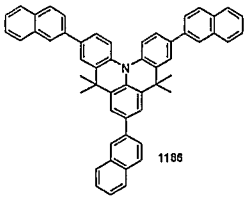
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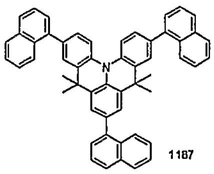
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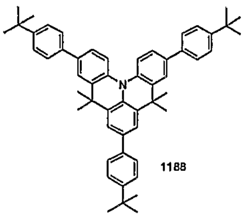
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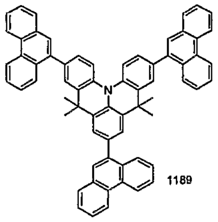
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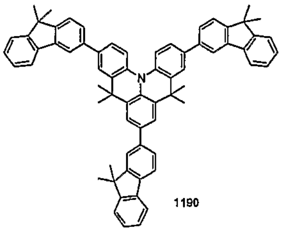
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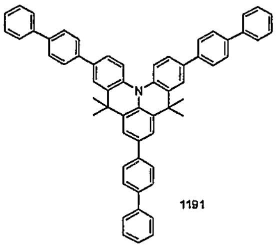
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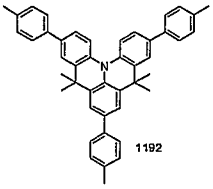
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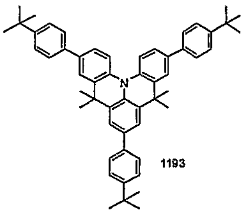
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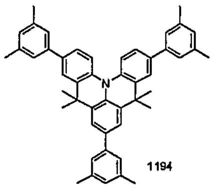
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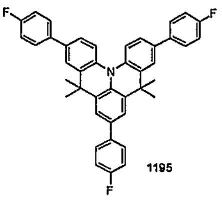
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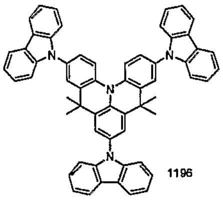
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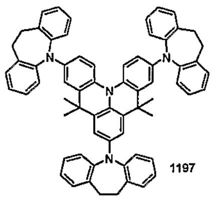
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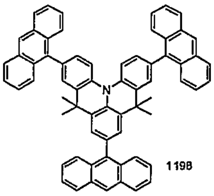
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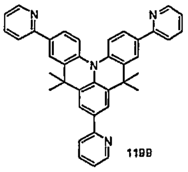
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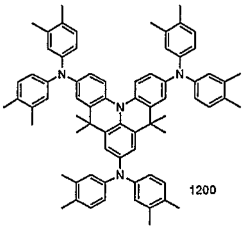
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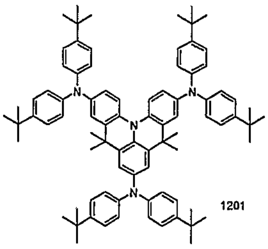
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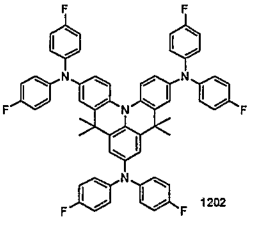
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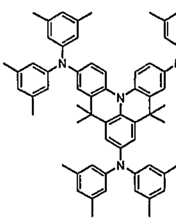
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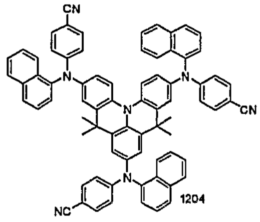
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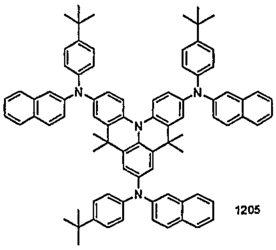
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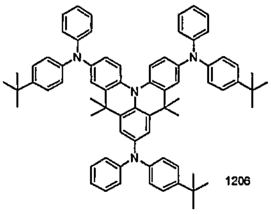
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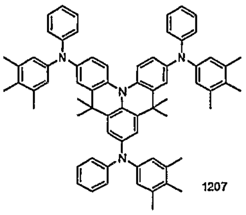
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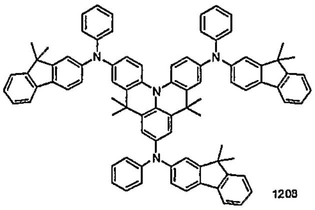
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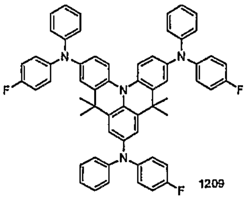
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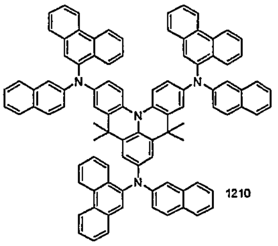
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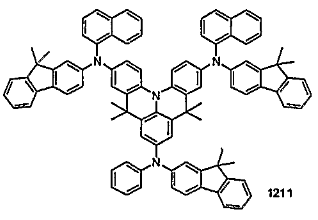
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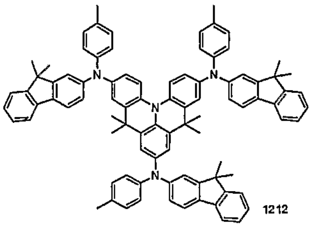
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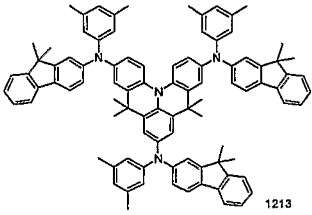
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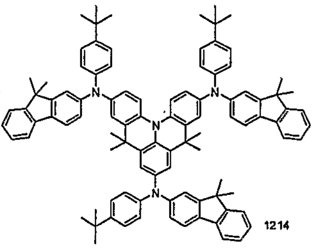
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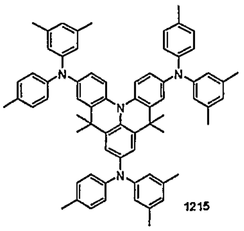
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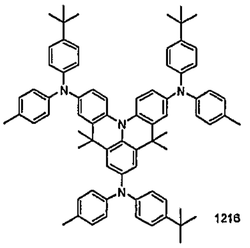
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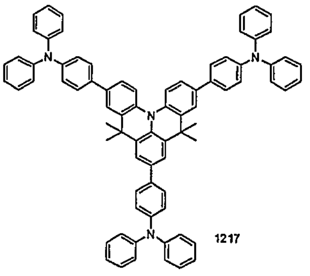
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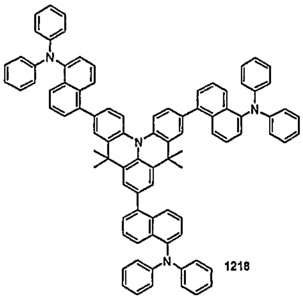
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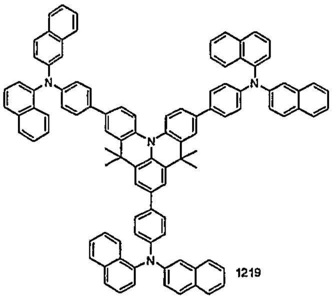
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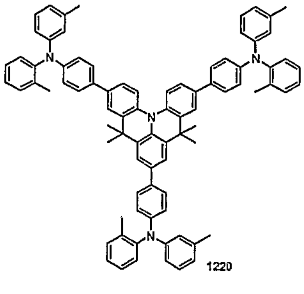
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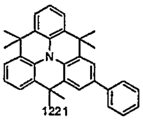
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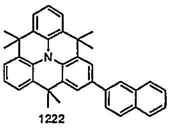
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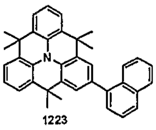
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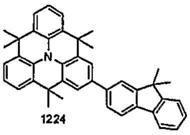
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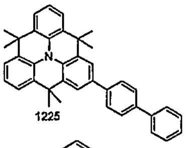
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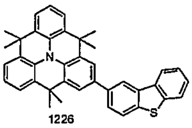
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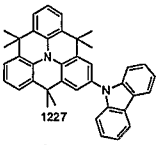
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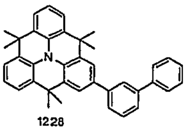
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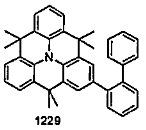
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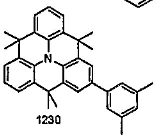
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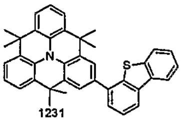
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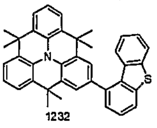
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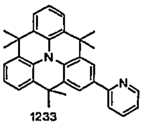
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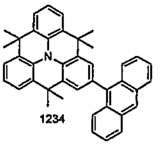
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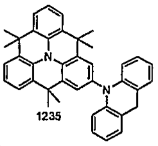
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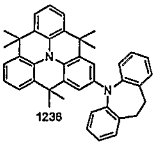
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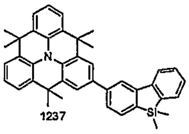
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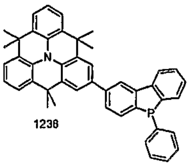
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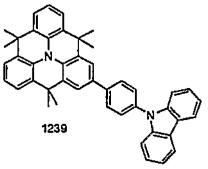
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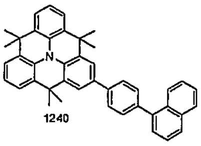
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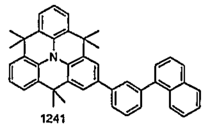
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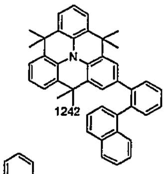
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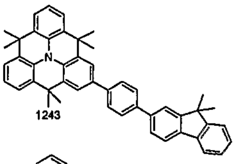
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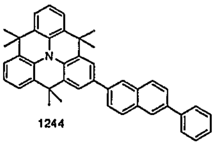
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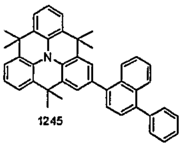
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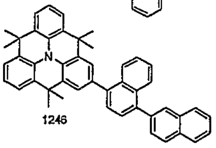
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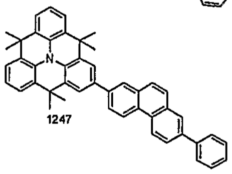
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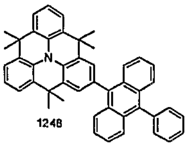
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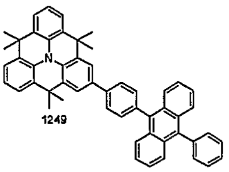
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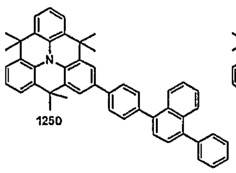
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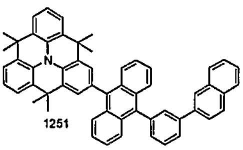
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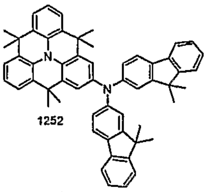
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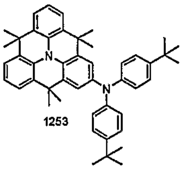
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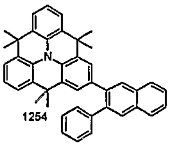
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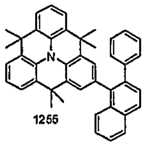
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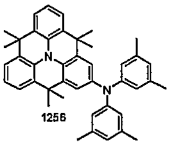
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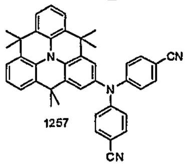
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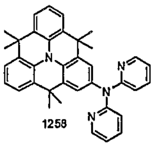
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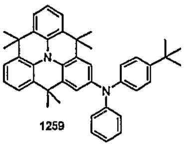
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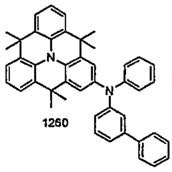
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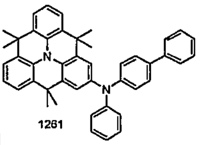
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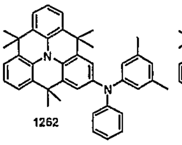
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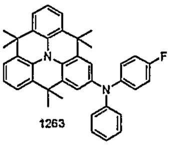
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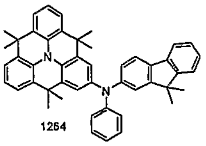
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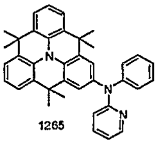
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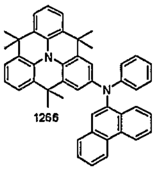
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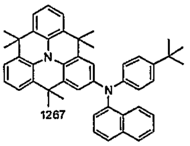
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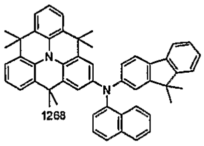
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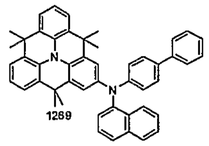
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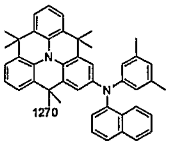
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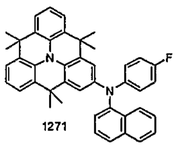
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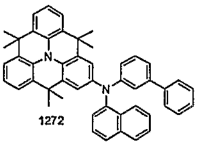
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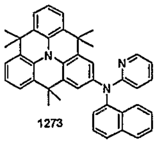
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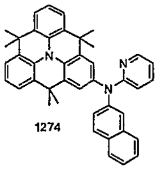
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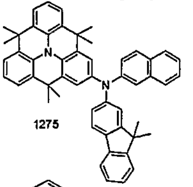
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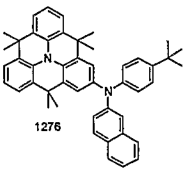
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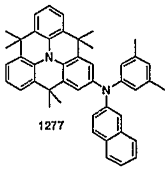
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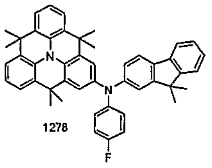
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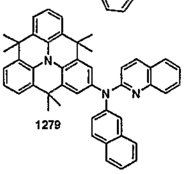
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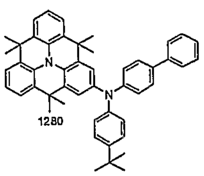
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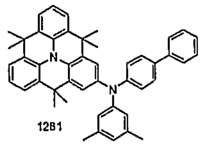
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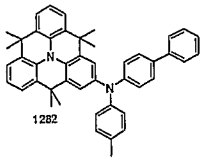
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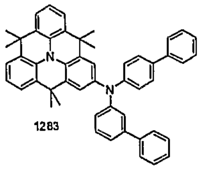
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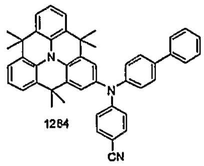
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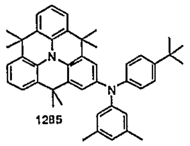
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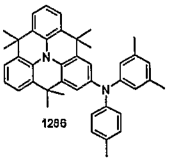
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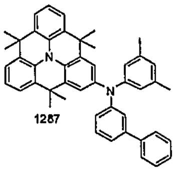
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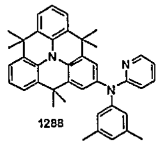
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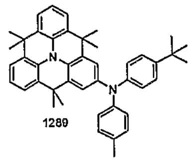
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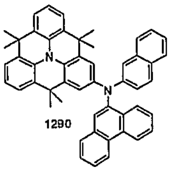
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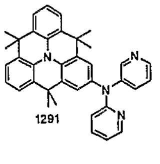
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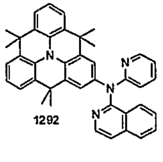
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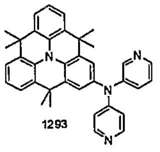
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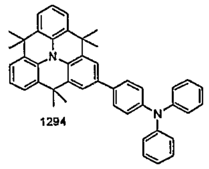
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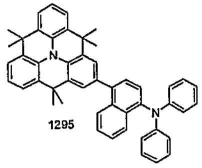
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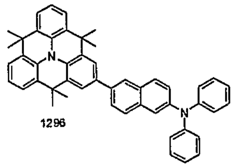
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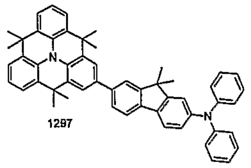
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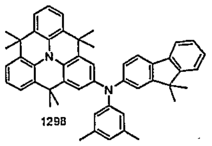
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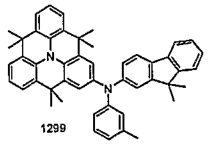
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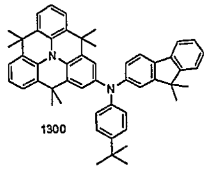
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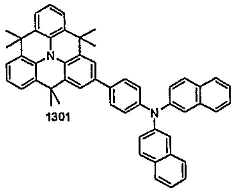
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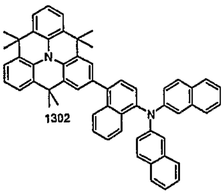
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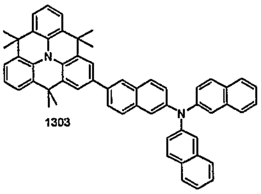
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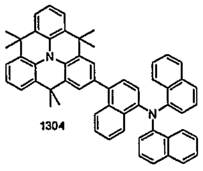
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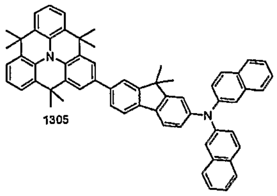
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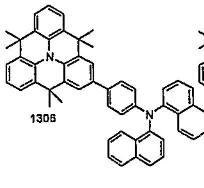
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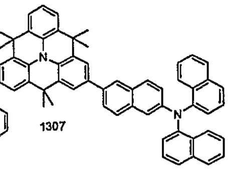
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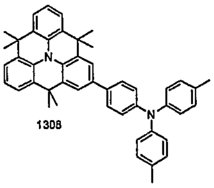
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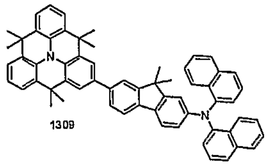
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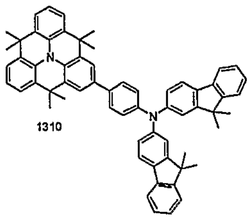
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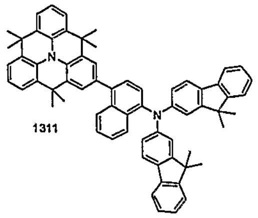
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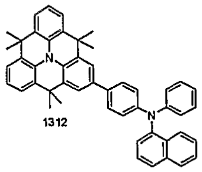
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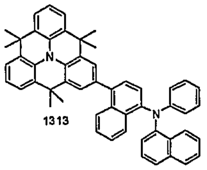
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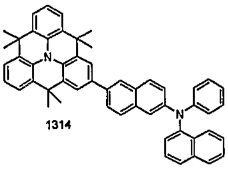
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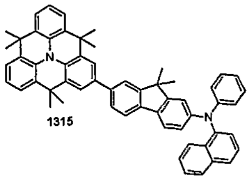
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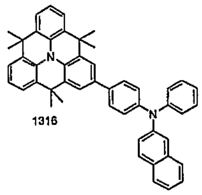
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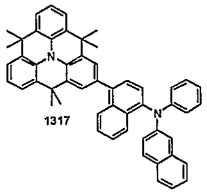
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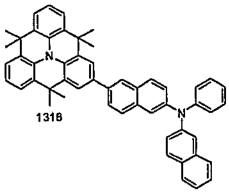
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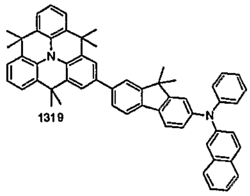
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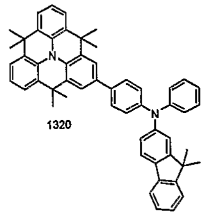
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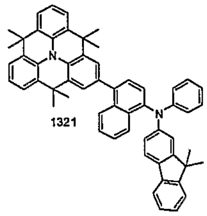
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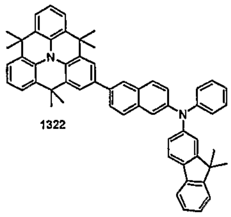
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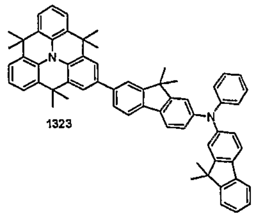
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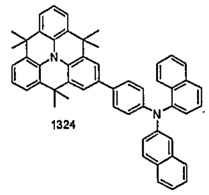
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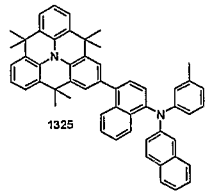
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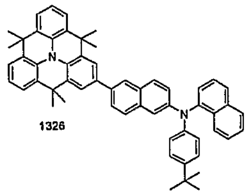
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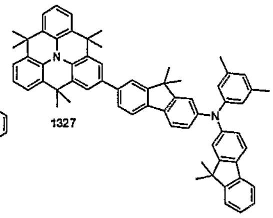
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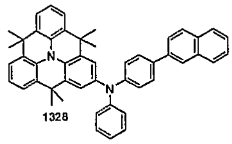
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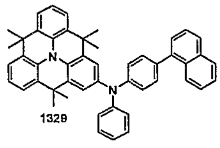
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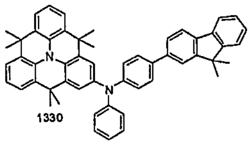
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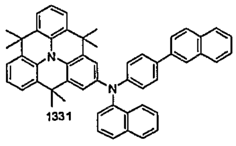
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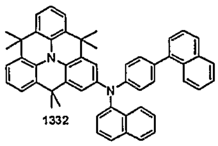
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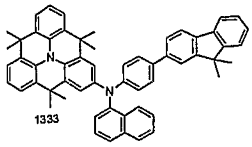
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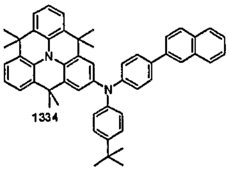
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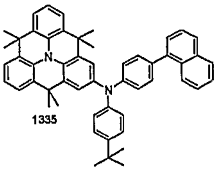
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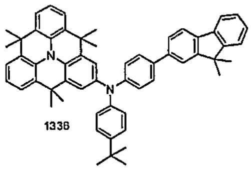
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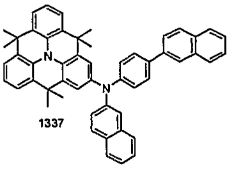
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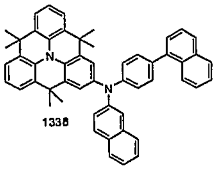
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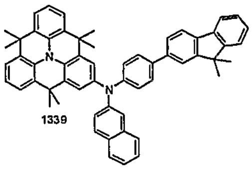
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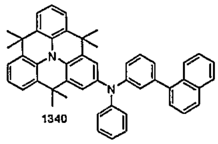
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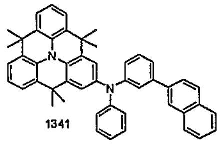
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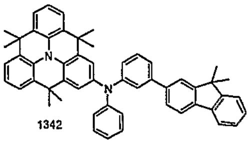
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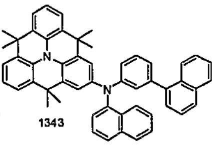
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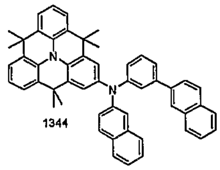
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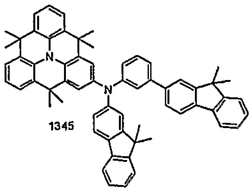
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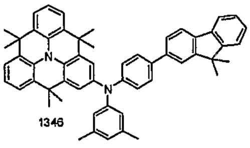
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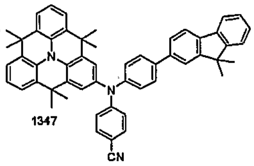
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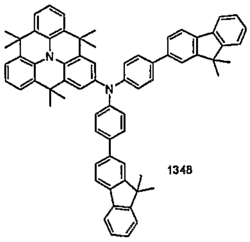
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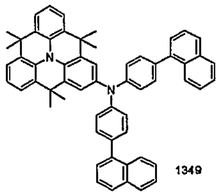
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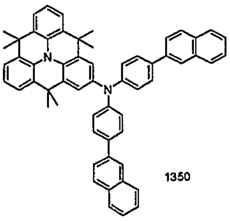
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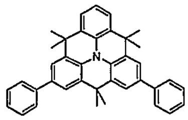
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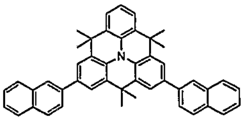
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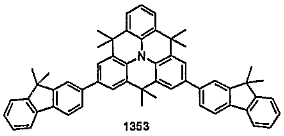
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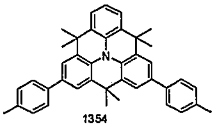
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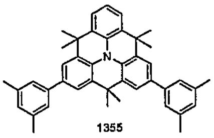
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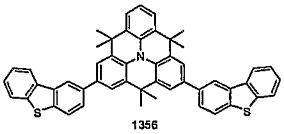
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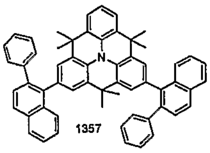
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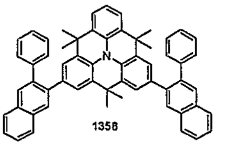
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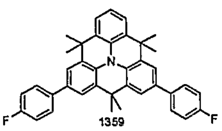
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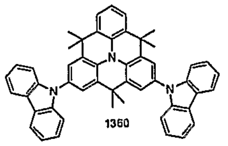
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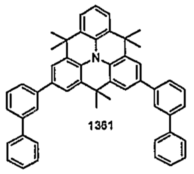
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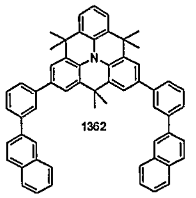
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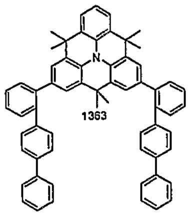
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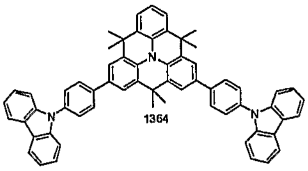
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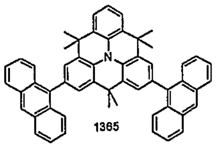
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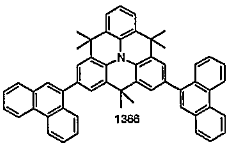
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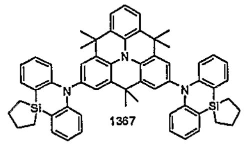
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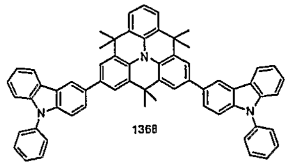
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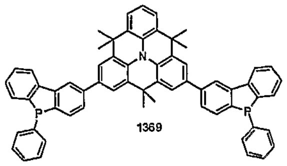
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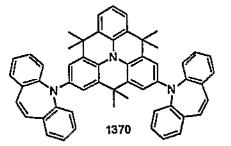
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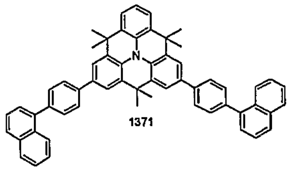
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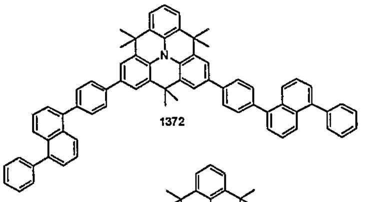
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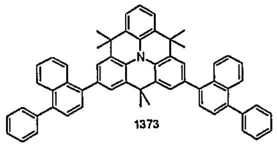
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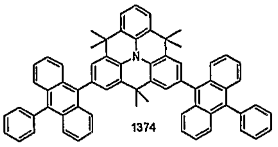
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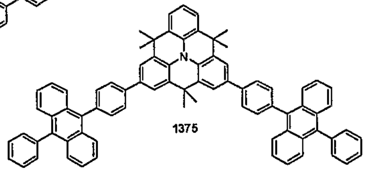
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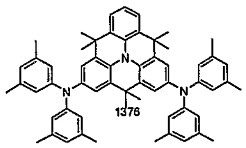
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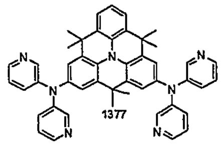
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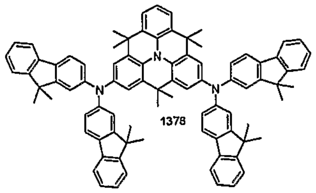
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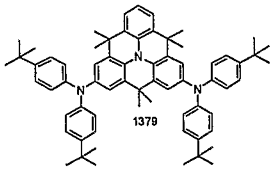
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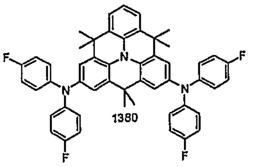
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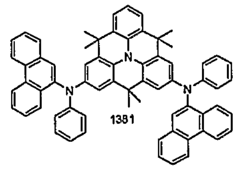
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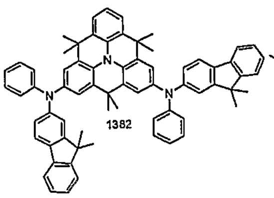
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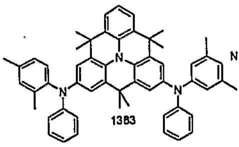
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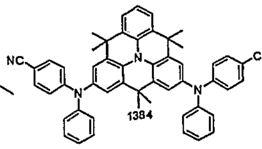
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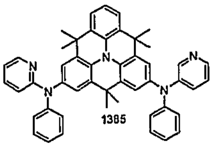
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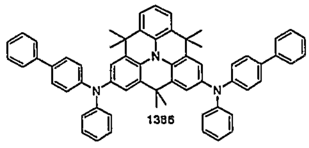
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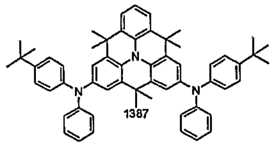
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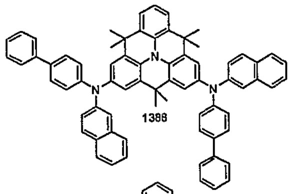
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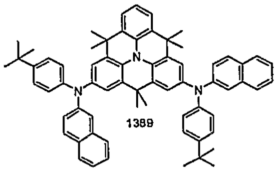
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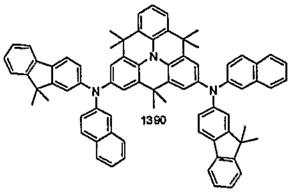
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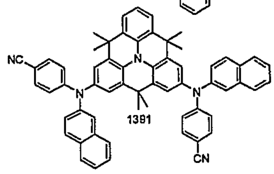
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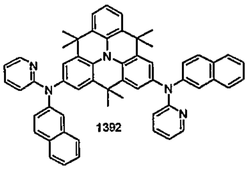
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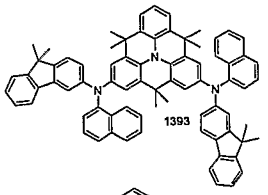
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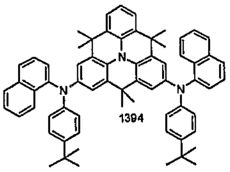
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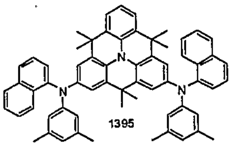
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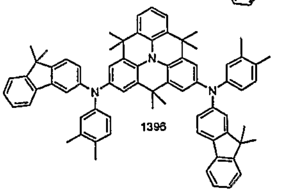
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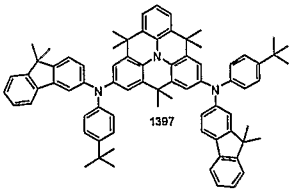
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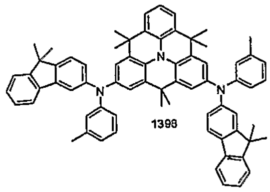
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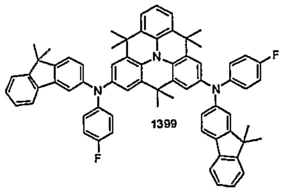
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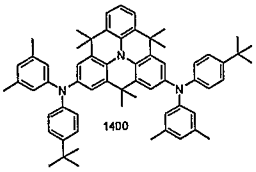
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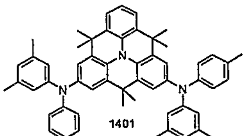
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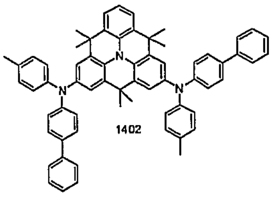
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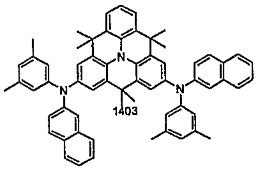
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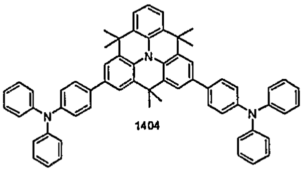
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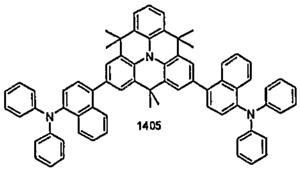
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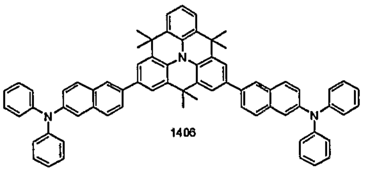
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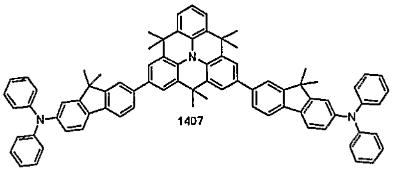
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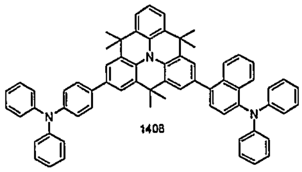
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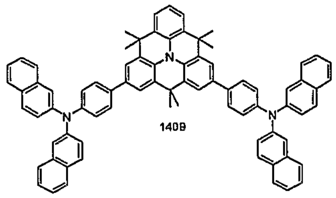
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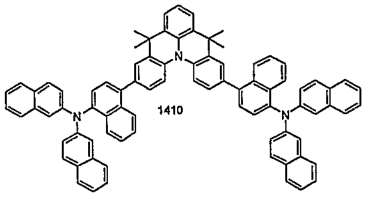
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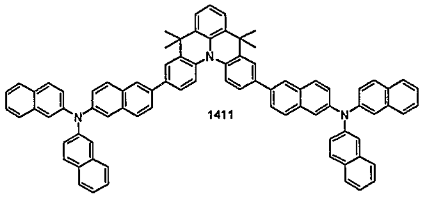
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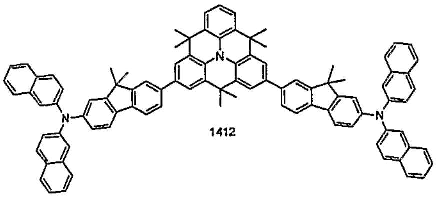
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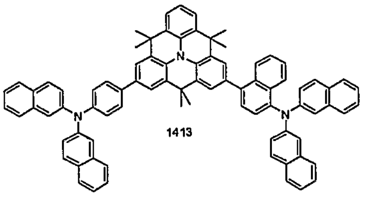
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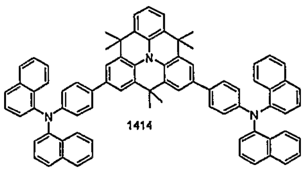
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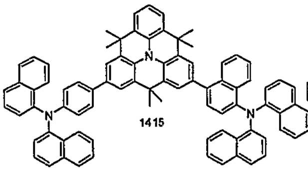
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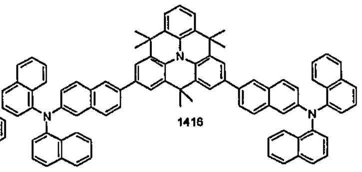
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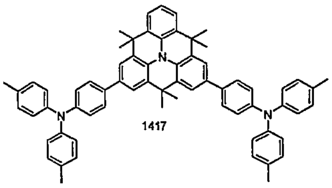
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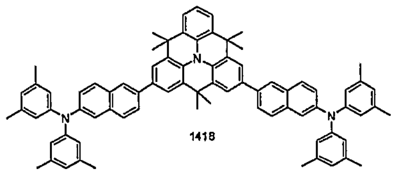
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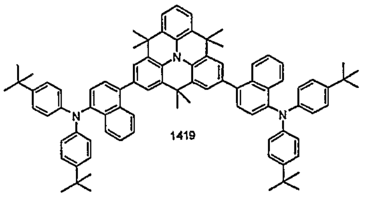
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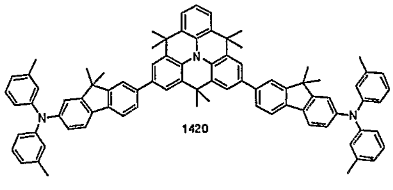
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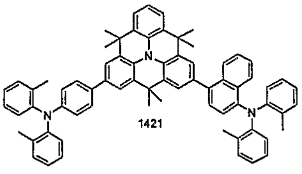
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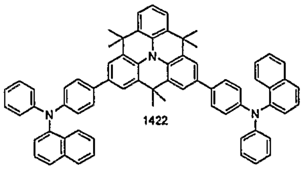
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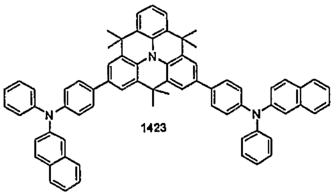
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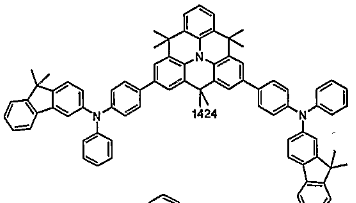
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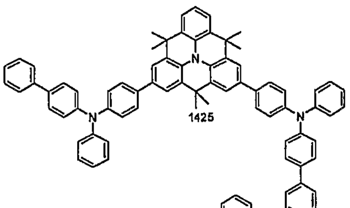
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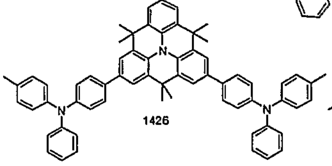
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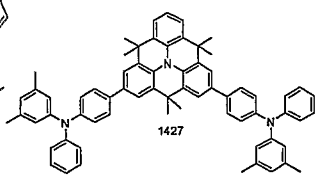
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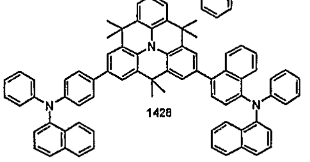
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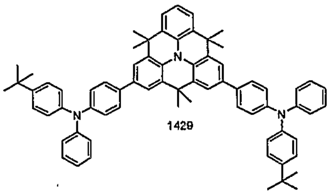
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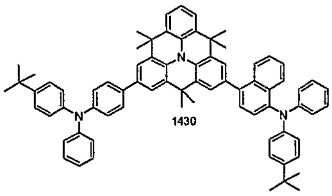
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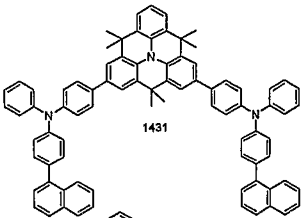
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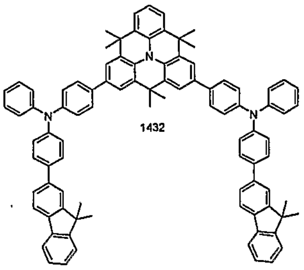
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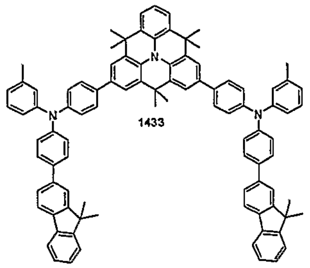
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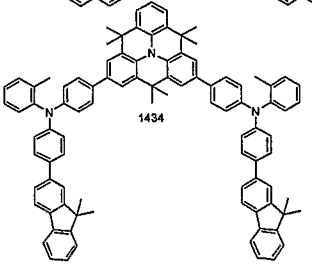
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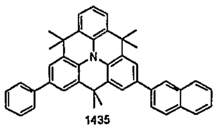
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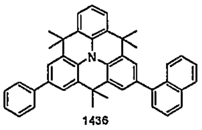
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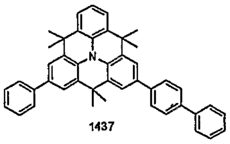
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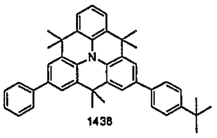
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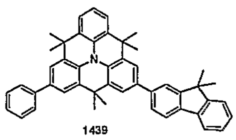
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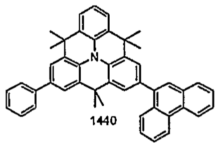
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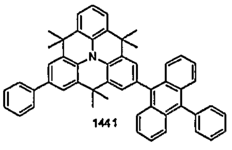
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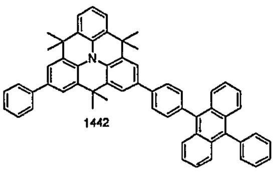
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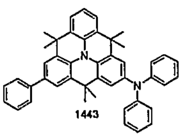
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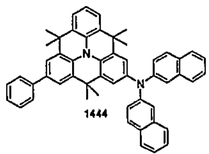
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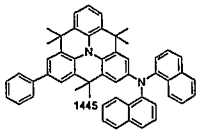
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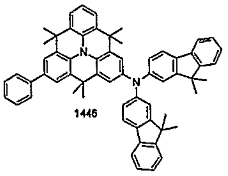
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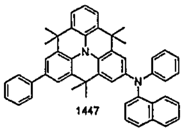
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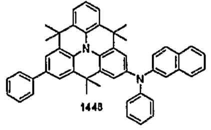
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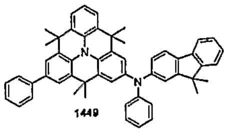
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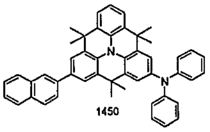
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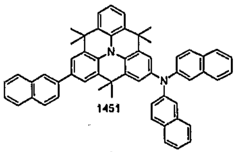
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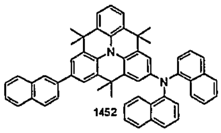
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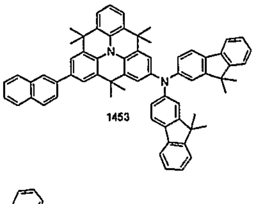
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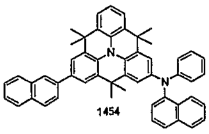
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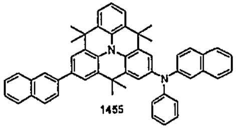
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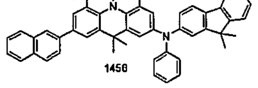
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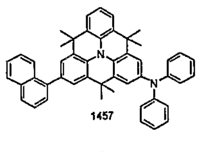
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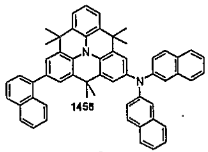
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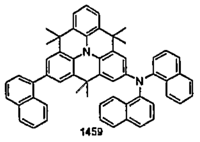
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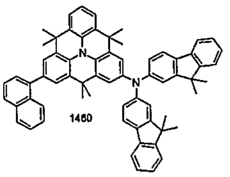
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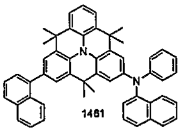
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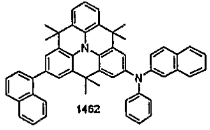
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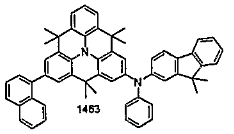
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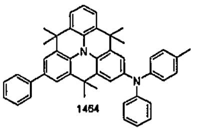
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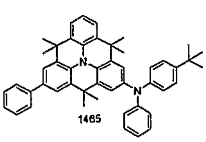
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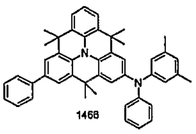
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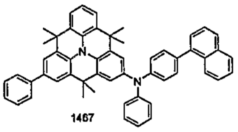
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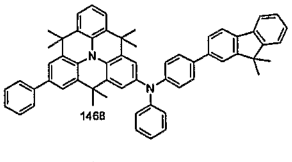
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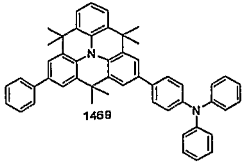
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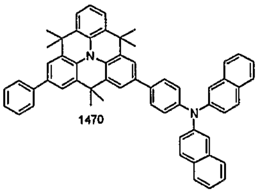
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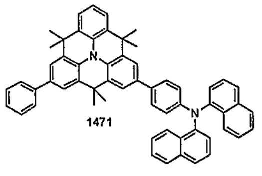
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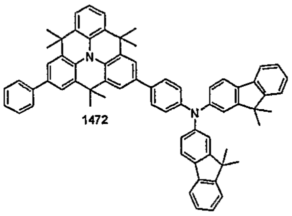
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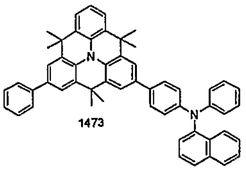
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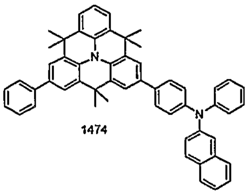
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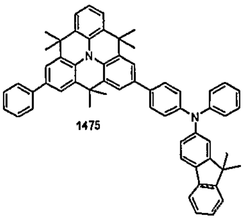
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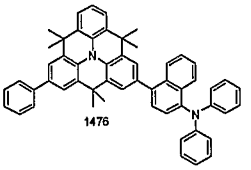
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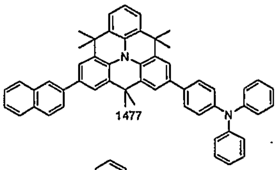
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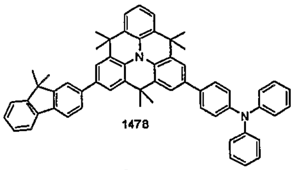
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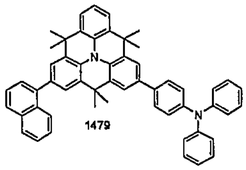
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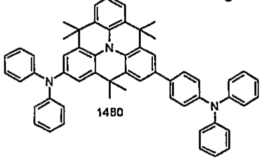
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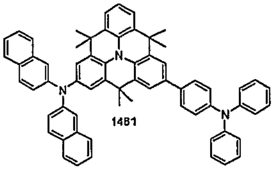
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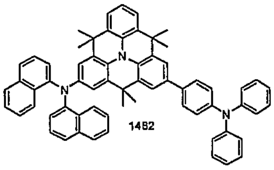
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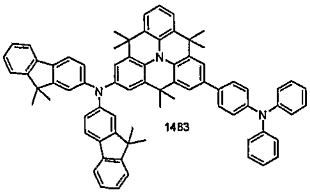
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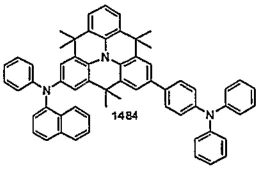
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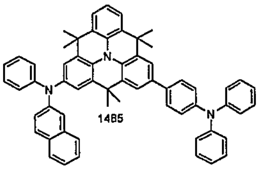
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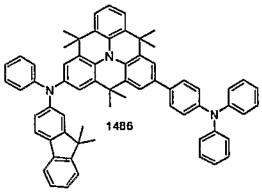
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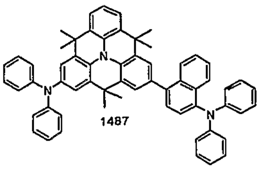
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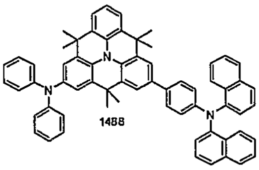
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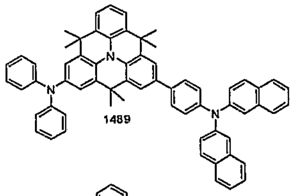
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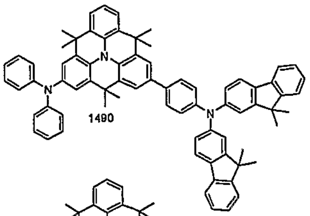
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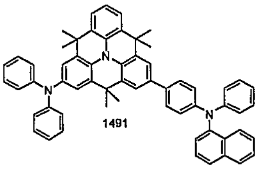
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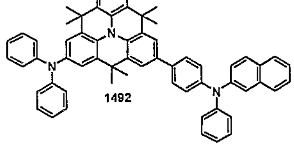
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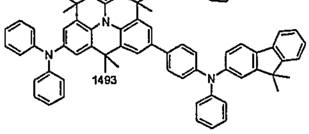
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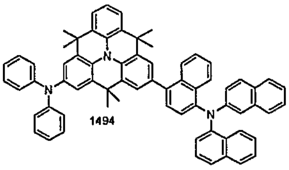
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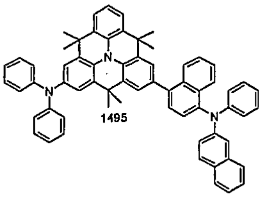
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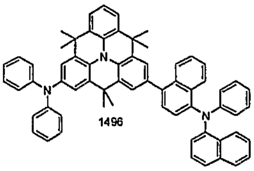
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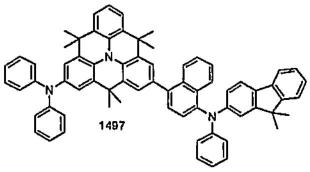
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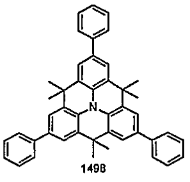
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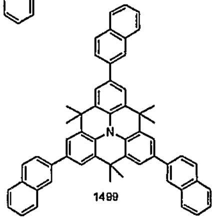
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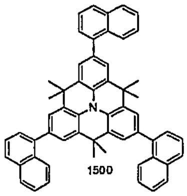
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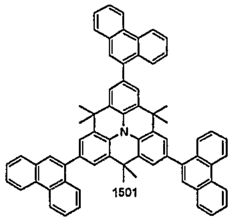
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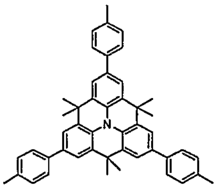
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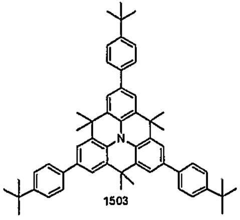
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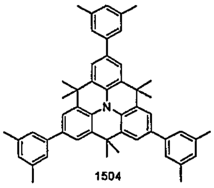
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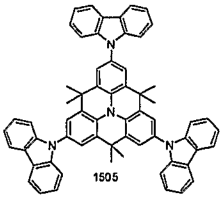
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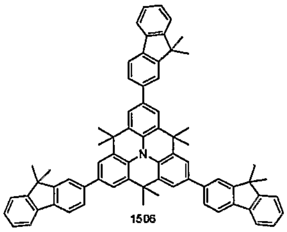
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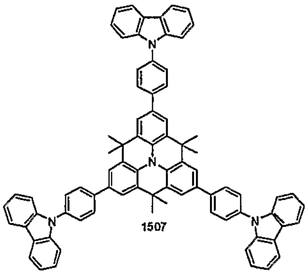
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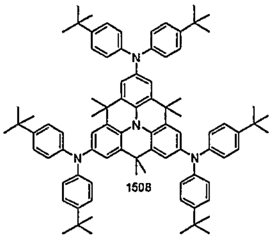
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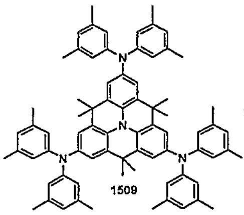
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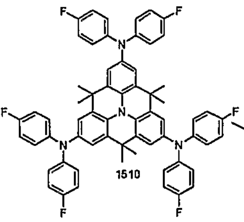
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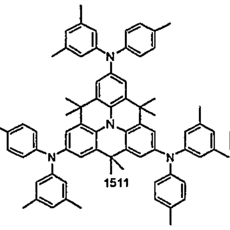
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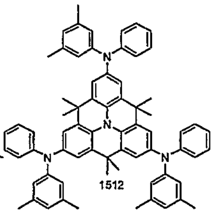
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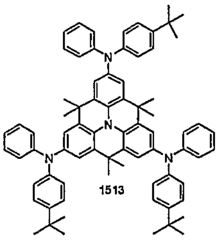
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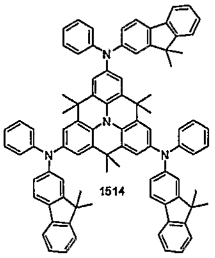
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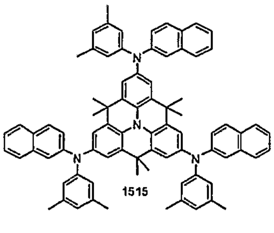
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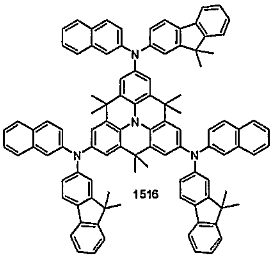
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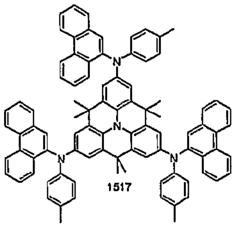

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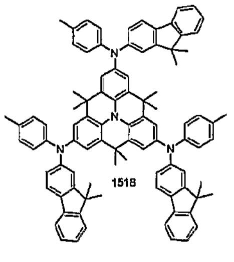

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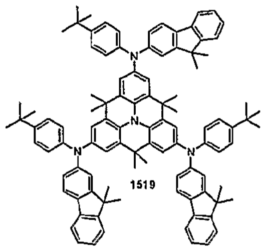

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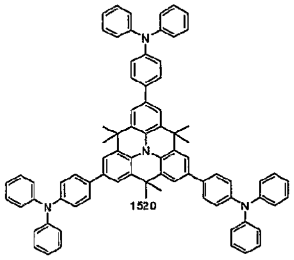

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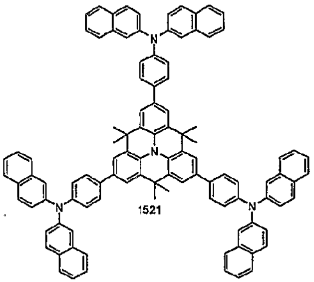

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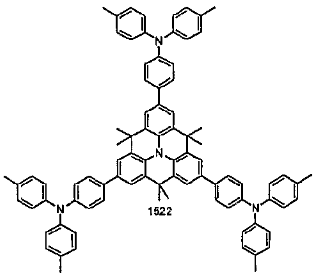

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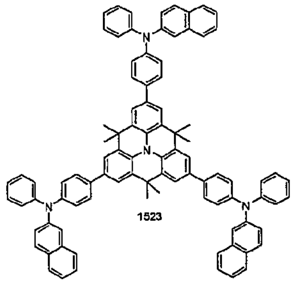

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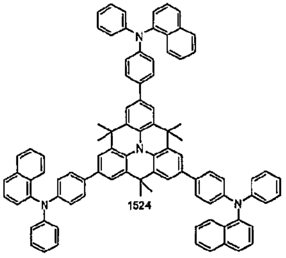

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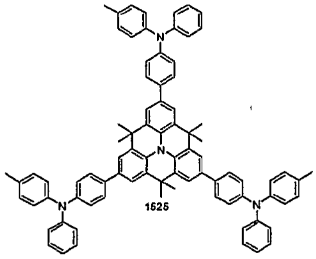

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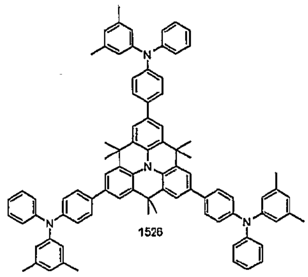

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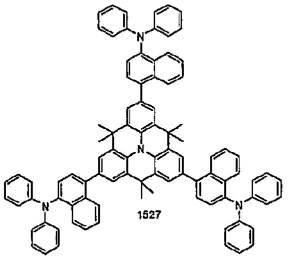

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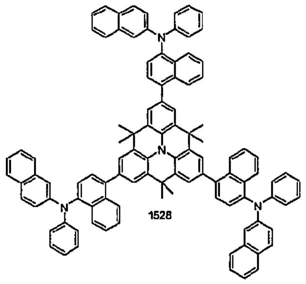

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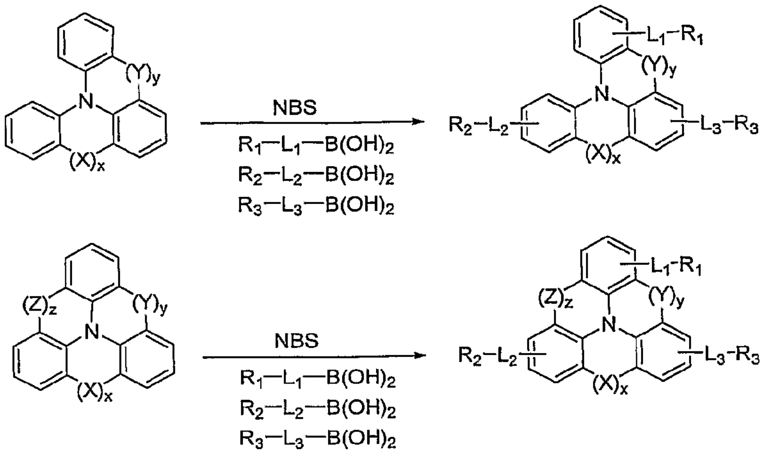
<130>

<131>

<132> The compounds for organic electronic material according to the present invention can be prepared by a procedure as illustrated by Reaction Schemes (1):

<133> [Reaction Scheme 1]



<134>

<135> wherein, L_1, L_2, L_3, R_1, R_2, R_3, R_{31} and R_{32} are defined as in Chemical Formula (1) or (2).

<136> The present invention also provides organic solar cells, which comprises one or more compound(s) for organic electronic material represented by Chemical Formula (1) or (2).

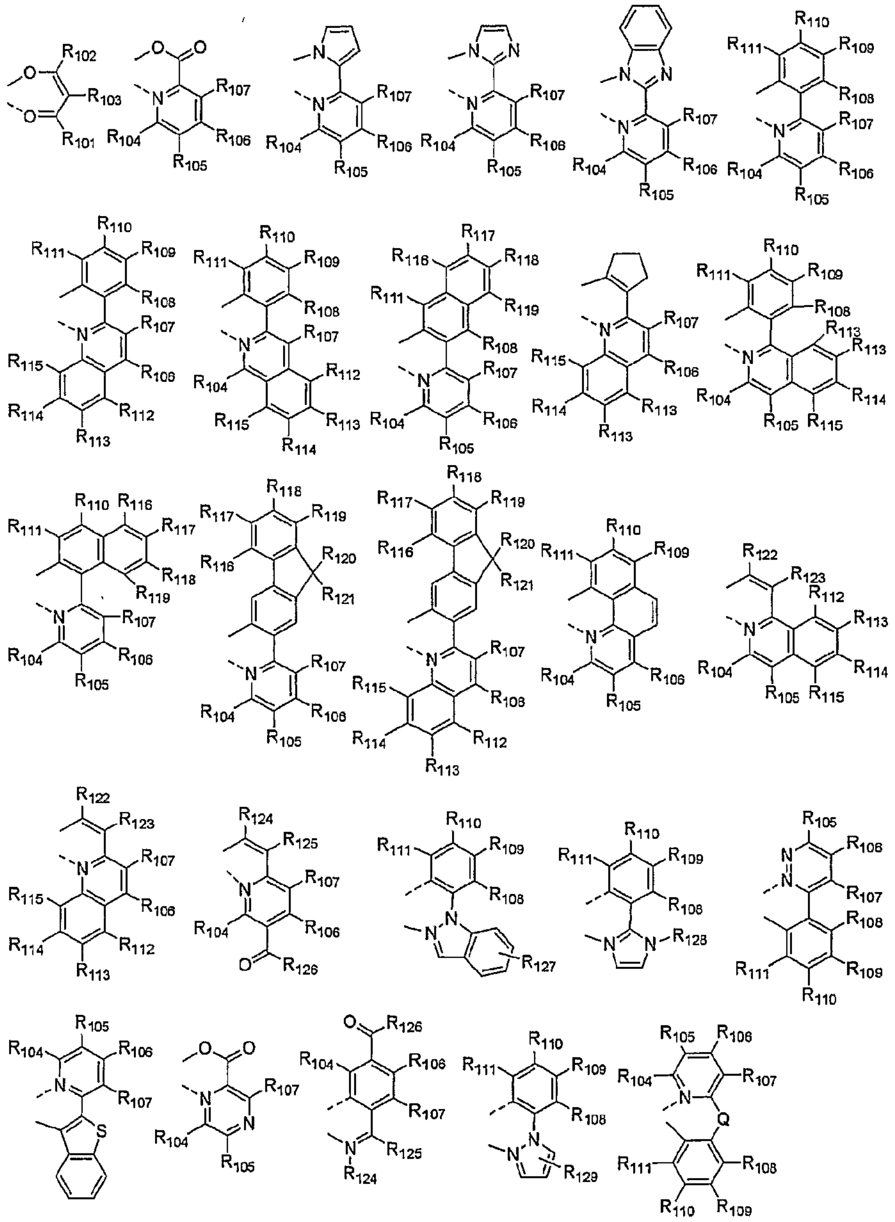
<137> The present invention also provides an organic electronic device which is comprised of a first electrode; a second electrode; and at least one organic layer(s) interposed between the first electrode and the second electrode; wherein the organic layer comprises one or more compound(s) for organic electronic material represented by Chemical Formula (1) or (2). The compounds for organic electronic material may be used as material for forming a hole injecting layer or a hole transport layer, or host material for an electroluminescent layer.

<138> The organic electronic device according to the present invention is characterized in that the organic layer comprises an electroluminescent layer, which comprises one or more dopant(s), in addition to one or more compound(s) for organic electronic material represented by Chemical Formula (1) or (2). The dopant to be applied to the organic electronic device according to the invention is not particularly restricted, but preferably selected from compounds represented by Chemical Formula (7):

<139> [Chemical Formula 7]

<140> $M^1L^{101}L^{102}L^{103}$

<141> wherein, M^1 is selected from a group consisting of metals of Group 7, 8, 9, 10, 11, 13, 14, 15 and 16 in the Periodic Table of Elements, and ligands L^{101}, L^{102} and L^{103} are independently selected from the following structures:



<142>

<143> wherein, R_{101} through R_{103} independently represent hydrogen, deuterium,

(C1-C60)alkyl with or without halogen substituent(s), (C6-C60)aryl with or without (C1-C60)alkyl substituent(s), or halogen;

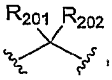
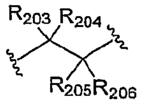
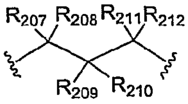
<144> R_{104} through R_{119} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C1-C30)alkyloxy, (C3-C60)cycloalkyl, (C2-C30)alkenyl, (C6-C60)aryl, mono or di(C1-C30)alkylamino, mono or di(C6-C30)arylamino, SF_5, tri(C1-C30)alkylsilyl, di(C1-C30)alkyl(C6-C30)arylsilyl, tri(C6-C30)arylsilyl, cyano or halogen; the alkyl, cycloalkyl, alkenyl or aryl of R_{104} through R_{119} may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, (C6-C60)aryl and halogen;

<145> R_{120} through R_{123} independently represent hydrogen, deuterium, (C1-C60)alkyl with or without halogen substituent(s), or (C6-C60)aryl with or without (C1-C60)alkyl substituent(s);

<146> R_{124} and R_{125} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl or halogen, or R_{124} and R_{125} may be linked via (C3-C12)alkylene or (C3-C12)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring; the alkyl or aryl of R_{124} and R_{125}, or the alicyclic ring or the monocyclic or polycyclic aromatic ring formed therefrom by linkage via (C3-C12)alkylene or (C3-C12)alkenylene with or without a fused ring may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C30)alkyloxy, halogen, tri(C1-C30)alkylsilyl, tri(C6-C30)arylsilyl and (C6-C60)aryl;

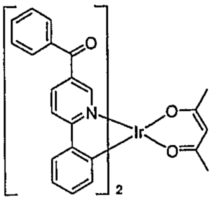
<147> R_{126} represents (C1-C60)alkyl, (C6-C60)aryl, (C5-C60)heteroaryl or halogen;

<148> R_{127} through R_{129} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl or halogen; the alkyl or aryl of R_{126} through R_{129} may be further substituted by halogen or (C1-C60)alkyl; and

<149> Q represents ,  or , wherein R_{201} through R_{212} independently represent hydrogen, deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C30)alkyloxy, halogen, (C6-C60)aryl, cyano or (C5-C60)cycloalkyl, or each of R_{201} through R_{212} may be linked to an adjacent substituent via alkylene or alkenylene to form a (C5-C7)spiro ring or a (C5-C9)fused ring, or linked to R_{107} or R_{108} via alkylene or alkenylene to form a (C5-C7)fused ring.

<150>

<151> The dopant compounds of Chemical Formula (7) can be exemplified by the following compounds, without restriction:



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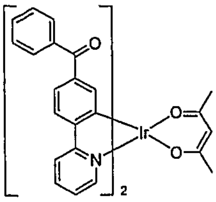
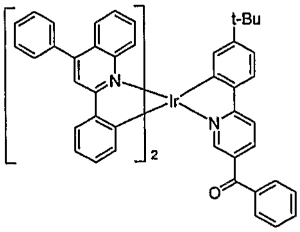


D-2



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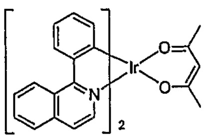

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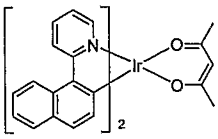

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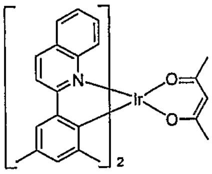

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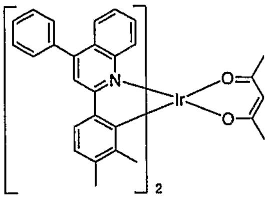

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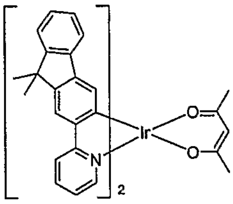

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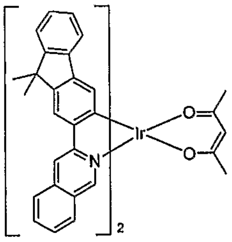

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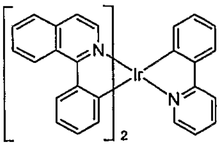

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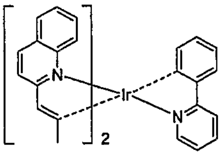

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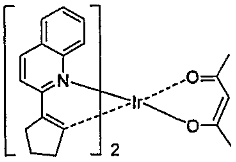

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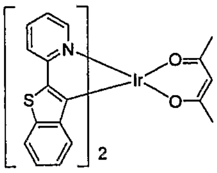

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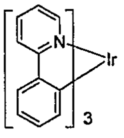

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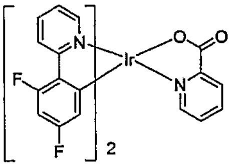

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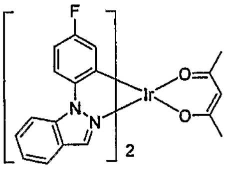

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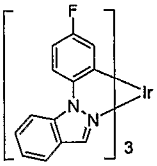

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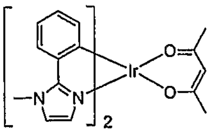

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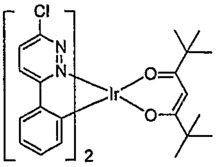

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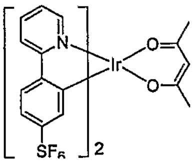

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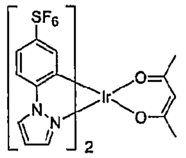

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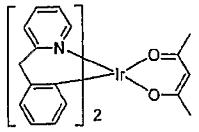

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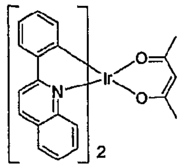

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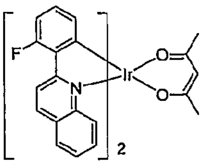

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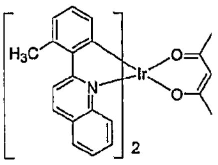

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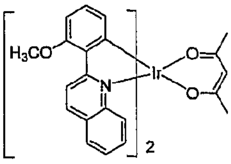

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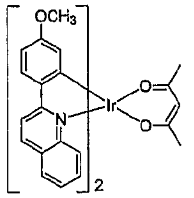

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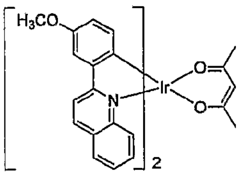

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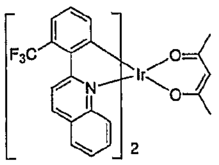

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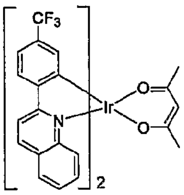

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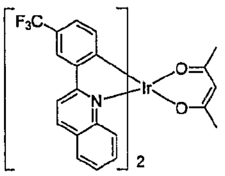

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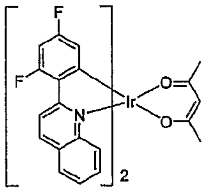

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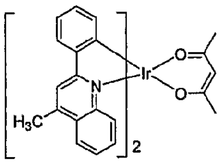

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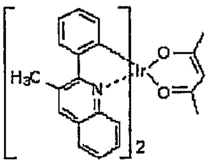

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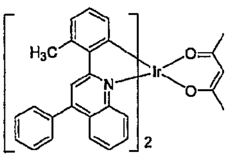

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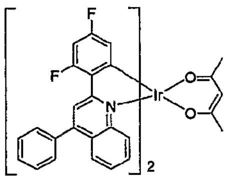
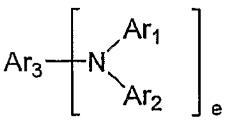


D-36

<153>

<154> The organic electronic device according to the invention may further comprise one or more compound(s) selected from a group consisting of arylamine compounds and styrylarylamine compounds, in addition to the compound for organic electronic material represented by Chemical Formula (1) or (2). Examples of the arylamine or styrylarylamine compounds include the compounds represented by Chemical Formula (8), but they are not restricted thereto:

<155> [Chemical Formula 8]



$$Ar_3\left[N(Ar_1)(Ar_2)\right]_e$$

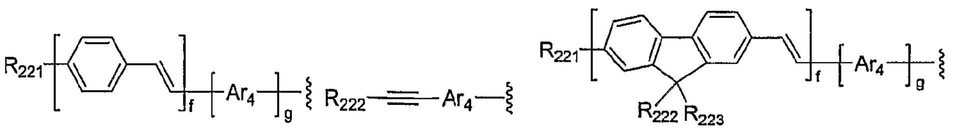
<156>

<157> wherein, Ar$_1$ and Ar$_2$ independently represent (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, (C6-C60)arylamino, (C1-C60)alkylamino, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, or (C3-C60)cycloalkyl, or Ar$_1$ and Ar$_2$ may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<158> the aryl, heteroaryl, arylamino or heterocycloalkyl of Ar$_1$ and Ar$_2$ may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C1-C60)alkoxy, (C1-C60)alkylthio, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C6-C60)arylcarbonyl, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, carboxyl, nitro and hydroxyl;

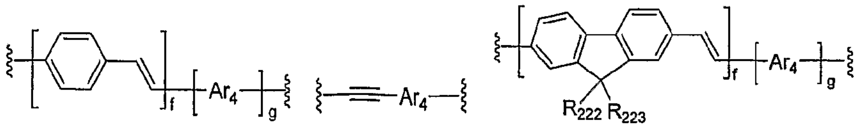
<159> when e is 1, Ar$_3$ represents (C6-C60)aryl, (C4-C60)heteroaryl, or a substituent selected from the following structures:

<160>



<161> when e is 2, Ar$_3$ represents (C6-C60)arylene, (C4-C60)heteroarylene, or a substituent selected from the following structures:

<162>



<163> wherein Ar$_4$ represents (C6-C60)arylene or (C4-C60)heteroarylene;

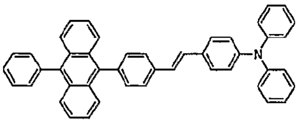
<164> R$_{221}$, R$_{222}$ and R$_{223}$ independently represent hydrogen, deuterium, (C1-

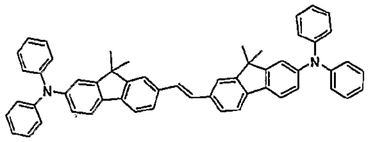
C60)alkyl or (C6-C60)aryl;

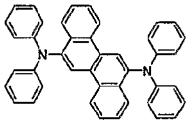
<165> f is an integer from 1 to 4, g is an integer of 0 or 1; and

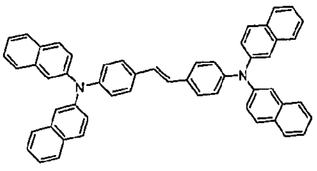
<166> the alkyl, aryl, heteroaryl, arylamino, alkylamino, cycloalkyl or heterocycloalkyl of Ar_1 and Ar_2; the aryl, heteroaryl, arylene or heteroarylene of Ar_3; the arylene or heteroarylene of Ar_4 and Ar_5; or the alkyl or aryl of R_{221} through R_{223} may be further substituted by one or more substituent(s) selected from a group consisting of deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C1-C60)alkyloxy, (C6-C60)arylthio, (C1-C60)alkylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl.

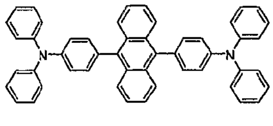
<167> The arylamine compounds and styrylarylamine compounds can be more specifically exemplified by the following compounds, but are not restricted thereto.

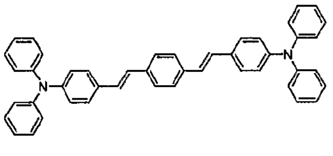


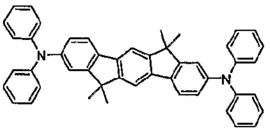


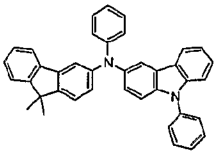


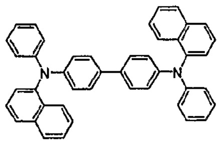












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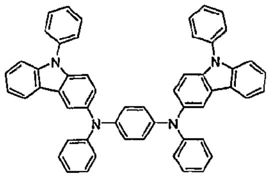
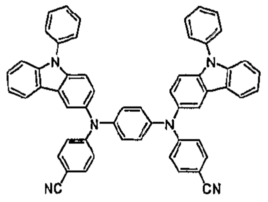
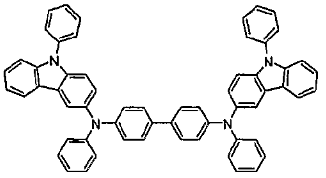
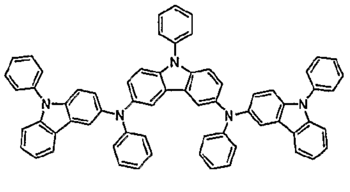
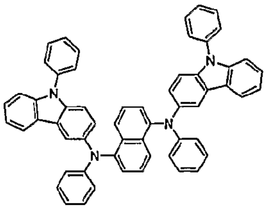
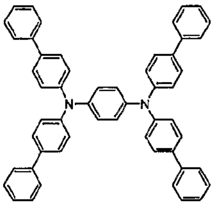


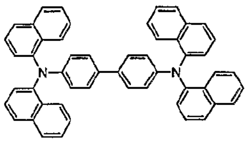


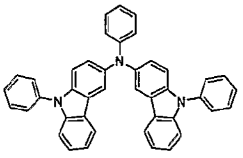


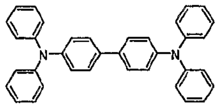


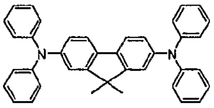


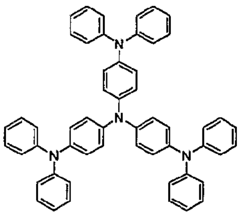


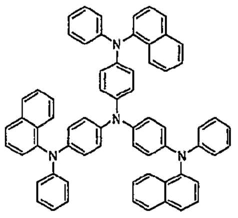


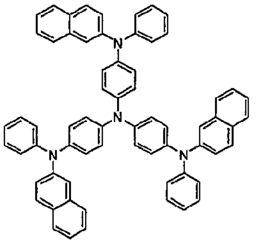












<169>

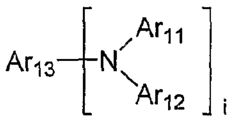
<170> In an organic electronic device according to the present invention, the organic layer may further comprise one or more metal(s) selected from a group consisting of organometals of Group 1, Group 2, 4th period and 5th period transition metals, lanthanide metals and d-transition elements in the Periodic Table of Elements, in addition to the compounds for organic electronic material represented by Chemical Formula (1) or (2). The organic layer may comprise an electroluminescent layer and a charge generating layer at the same time.

<171> The present invention can realize an organic electronic device having a pixel structure of independent light-emitting mode, which comprises an organic electronic device containing the compound for organic electronic material of Chemical Formula (1) or (2) as a sub-pixel and one or more sub-pixel(s) comprising one or more metallic compound(s) selected from a group

consisting of Ir, Pt, Pd, Rh, Re, Os, Tl, Pb, Bi, In, Sn, Sb, Te, Au and Ag, patterned in parallel at the same time.

<172> The organic electronic device may comprise one or more compound(s) selected from compounds having electroluminescent peak of wavelength of blue, green or red in addition to the organic electroluminescent compound in the organic layer to form a white electroluminescent device. The compounds having electroluminescent peak of wavelength of blue, green or red can be exemplified by those represented by one of Chemical Formulas (9) to (12), but they are not restricted thereto.

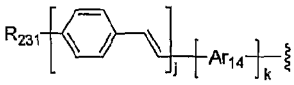
<173> [Chemical Formula 9]

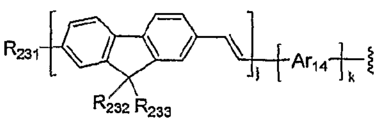


<174>

<175> In Chemical Formula (9), Ar_{11} and Ar_{12} independently represent (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, (C6-C60)arylamino, (C1-C60)alkylamino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, or (C3-C60)cycloalkyl, or Ar_{11} and Ar_{12} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

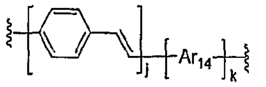
176> when i is 1, Ar_{13} represents (C6-C60)aryl, (C4-C60)heteroaryl, or a substituent selected from the following structures:

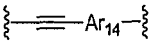


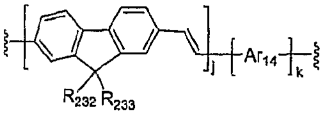


177>

178> when i is 2, Ar_{13} represents (C6-C60)arylene, (C4-C60)heteroarylene, or a substituent selected from the following structures:







79>

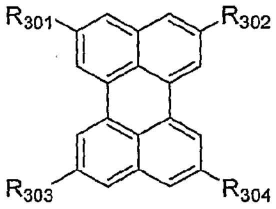
80> wherein Ar_{14} represents (C6-C60)arylene or (C4-C60)heteroarylene;

181> R_{231} through R_{233} independently represent hydrogen, deuterium, (C1-C60)alkyl or (C6-C60)aryl;

182> j is an integer from 1 to 4, k is an integer of 0 or 1; and

<183> the alkyl, aryl, heteroaryl, arylamino, alkylamino, cycloalkyl or heterocycloalkyl of Ar_{11} and Ar_{12}; the aryl, heteroaryl, arylene or heteroarylene of Ar_{13}; the arylene or heteroarylene of Ar_{14}; or the alkyl or aryl of R_{231} through R_{233} may be further substituted by one or more substituent(s) selected from a group consisting of deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C1-C60)alkyloxy, (C6-C60)arylthio, (C1-C60)alkylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl.

<184> [Chemical Formula 10]



<185>

<186> In Chemical Formula (10), R_{301} through R_{304} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-

C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl, or each of R_{301} through R_{304} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring; and

<187> the alkyl, alkenyl, alkynyl, cycloalkyl, heterocycloalkyl, aryl, heteroaryl, arylsilyl, alkylsilyl, alkylamino or arylamino of R_{301} through R_{304}, or the alicyclic ring, or the monocyclic or polycyclic aromatic ring formed therefrom by linkage to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro and hydroxyl.

<188> [Chemical Formula 11]

<189> $(Ar_{31})_p\text{-}L_{11}\text{-}(Ar_{32})_q$

<190> [Chemical Formula 12]

<191> $(Ar_{33})_r\text{-}L_{12}\text{-}(Ar_{34})_s$

<192> In Chemical Formulas (11) and (12),

<193> L_{11} represents (C6-C60)arylene or (C4-C60)heteroarylene;

<194> L_{12} represents anthracenylene;

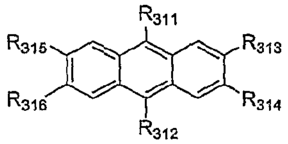
<195> Ar_{31} through Ar_{34} are independently selected from hydrogen, deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, halogen, (C4-C60)heteroaryl, (C5-C60)cycloalkyl and (C6-C60)aryl; the cycloalkyl, aryl or heteroaryl of Ar_{31} through Ar_{34} may be further substituted by one or more substituent(s) selected

from a group consisting of (C6-C60)aryl or (C4-C60)heteroaryl with or without one or more substituent(s) selected from a group consisting of deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl; (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl; and

<196> p, q, r and s independently represent an integer from 0 to 4.

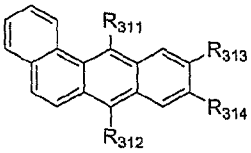
<197> The compounds represented by Chemical Formula (11) or (12) can be exemplified by anthracene derivatives or benz[a]anthracene derivatives represented by one of Chemical Formulas (13) to (16).

<198> [Chemical Formula 13]



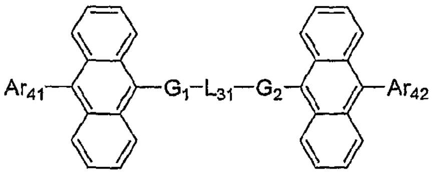
<199>

<200> [Chemical Formula 14]



<201>

<202> [Chemical Formula 15]



<203>

<204> In Chemical Formulas (13) through (15),

<205> R_{311} and R_{312} independently represent (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, or (C3-C60)cycloalkyl; the aryl or heteroaryl of R_{311} and R_{312} may be further substituted by one or more substituent(s) selected

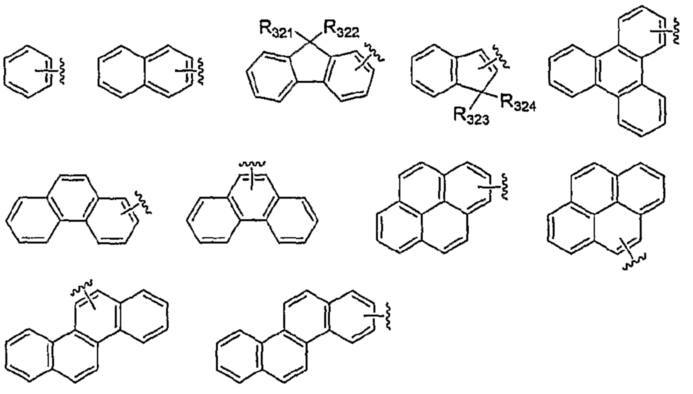
from a group consisting of deuterium, (C1-C60)alkyl, halo(C1-C60)alkyl, (C1-C60)alkoxy, (C3-C60)cycloalkyl, (C6-C60)aryl, (C4-C60)heteroaryl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl;

<206> R_{313} through R_{316} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, halogen, (C4-C60)heteroaryl, (C5-C60)cycloalkyl or (C6-C60)aryl, and the heteroaryl, cycloalkyl or aryl of R_{313} through R_{316} may be further substituted by one or more substituent(s) selected from a group consisting of deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl;

<207> G_1 and G_2 independently represent a chemical bond, or (C6-C60)arylene with or without one or more substituent(s) selected from (C1-C60)alkyl, (C1-C60)alkoxy, (C6-C60)aryl, (C4-C60)heteroaryl and halogen;

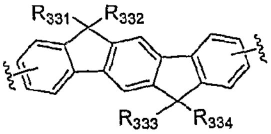
<208> Ar_{41} and Ar_{42} represent (C4-C60)heteroaryl or aryl selected from the following structures:

<209>



<210> the aryl or heteroaryl of Ar_{41} and Ar_{42} may be substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, (C6-C60)aryl and (C4-C60)heteroaryl;

<211> L_{31} represents (C6-C60)arylene, (C4-C60)heteroarylene or a group represented by the following structural formula:

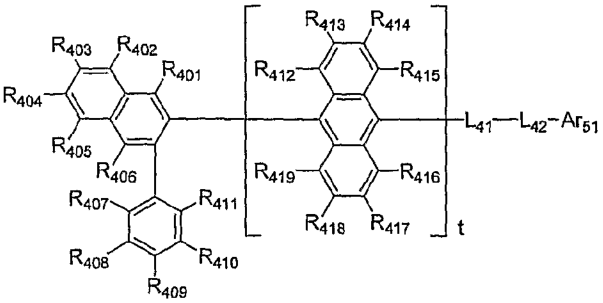
<212> 

<213> the arylene or heteroarylene of L_{31} may be substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, (C6-C60)aryl, (C4-C60)heteroaryl and halogen;

<214> R_{321} through R_{324} independently represent hydrogen, deuterium, (C1-C60)alkyl or (C6-C60)aryl, or each of them may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring; and

<215> R_{331} through R_{334} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, (C6-C60)aryl, (C4-C60)heteroaryl or halogen, or each of them may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring.

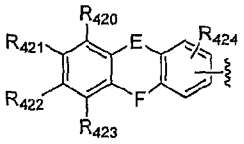
<216> [Chemical Formula 16]

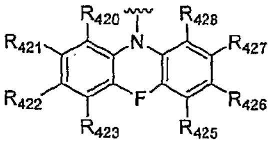
<217> 

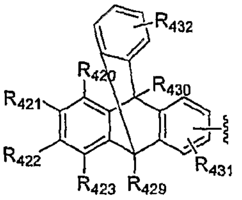
<218> In Chemical Formula (16), L_{41} and L_{42} independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene; the arylene or heteroarylene of L_{41} and L_{42} may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, halogen, cyano, (C1-C60)alkoxy, (C3-C60)cycloalkyl, (C6-C60)aryl, (C3-C60)heteroaryl, tri(C1-C30)alkylsilyl, di(C1-C30)alkyl(C6-C30)arylsilyl and tri(C6-C30)arylsilyl;

<219> R_{401} through R_{419} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl, or each of R_{401} through R_{419} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<220> Ar_{51} represents (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, adamantyl, (C7-C60)bicycloalkyl, or a substituent selected from the following structures:







<221>

<222> wherein, R_{420} through R_{432} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-c60)alkoxy, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl;

<223> E and F independently represent a chemical bond, $-(CR_{433}R_{434})_w-$, $-N(R_{435})-$, -S-, -O-, $-Si(R_{436})(R_{437})-$, $-P(R_{438})-$, -C(=O)-, $-B(R_{439})-$, $-In(R_{440})-$, -Se-,

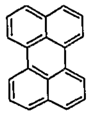
-Ge(R_{441})(R_{442})-, -Sn(R_{443})(R_{444})-, -Ga(R_{445})- or (R_{446})C=C(R_{447})-;

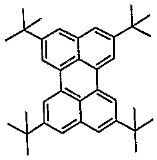
224> R_{433} through R_{445} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-c60)alkoxy, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl; or each of R_{433} through R_{445} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

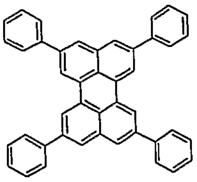
<225> the aryl, heteroaryl, heterocycloalkyl, adamantyl or bicycloalkyl of Ar_{51}; or the alkyl, alkenyl, alkynyl, cycloalkyl, heterocycloalkyl, aryl, heteroaryl, arylsilyl, alkylsilyl, alkylamino or arylamino of R_{401} through R_{445} may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro and hydroxyl; and

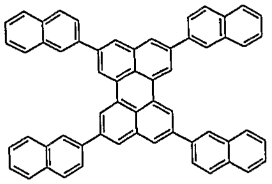
<226> t and w independently represent an integer from 1 to 4.

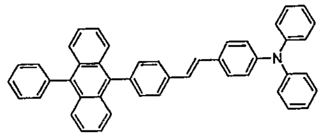
<227> The compounds having electroluminescent peak of wavelength of blue, green or red color, to be contained in the electroluminescent layer can be exemplified by the following compounds, without restriction.

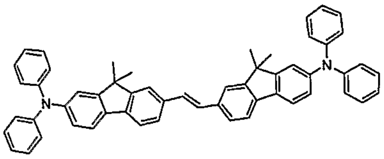


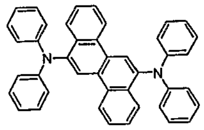


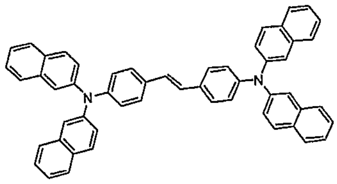


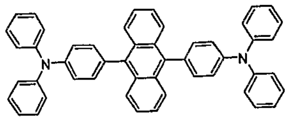


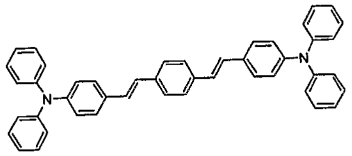


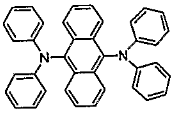


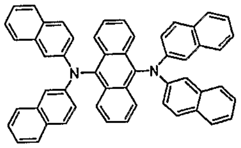


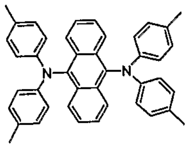


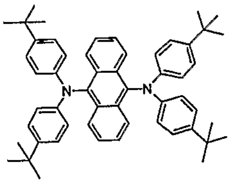












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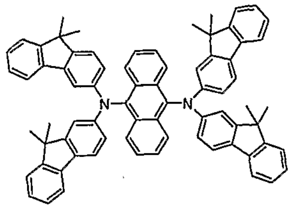
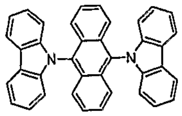
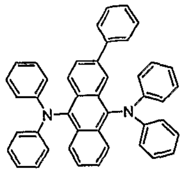
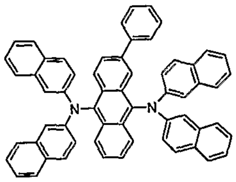
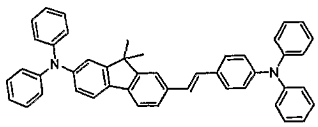
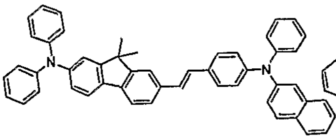
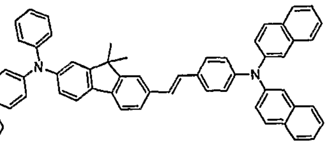
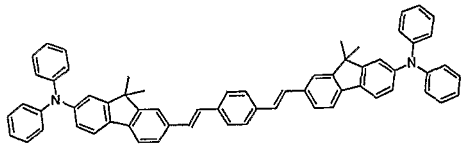
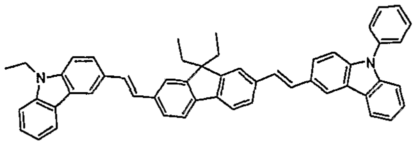
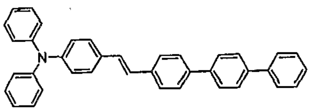
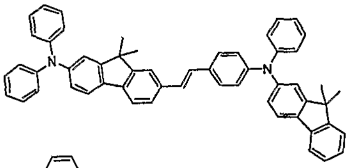
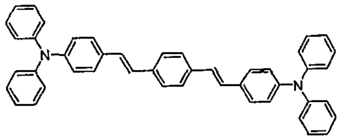
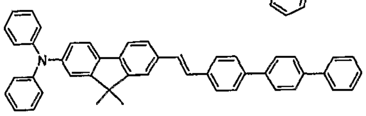
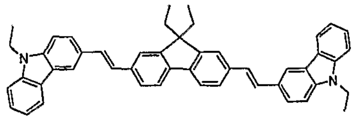
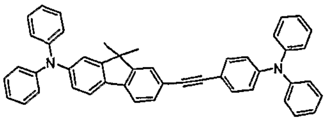
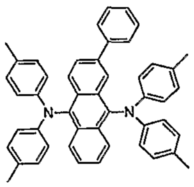
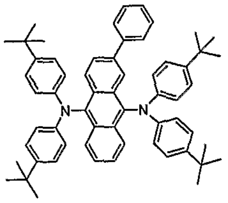
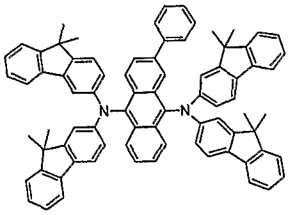
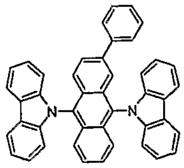

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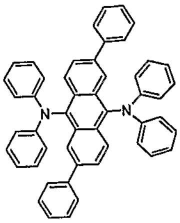

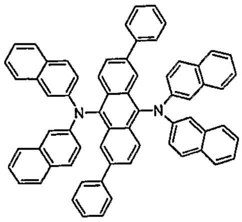

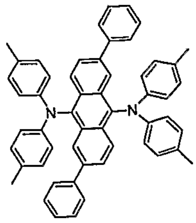

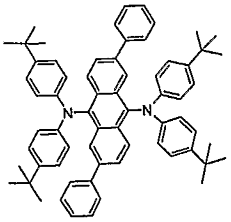

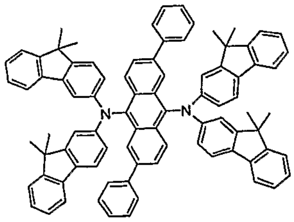

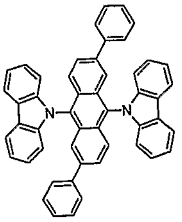

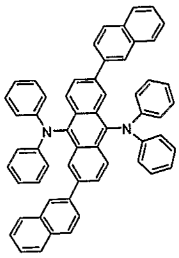

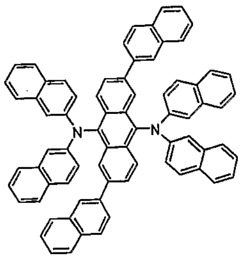

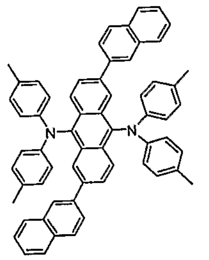

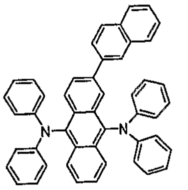

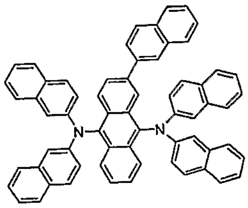

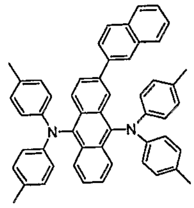

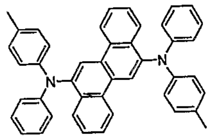

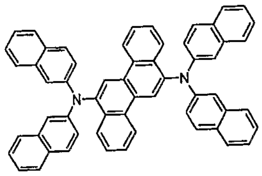

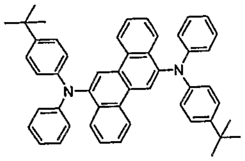

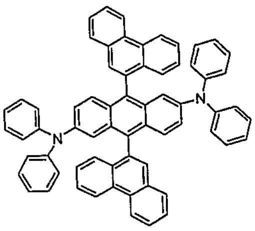

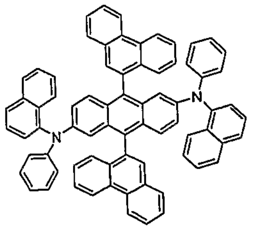

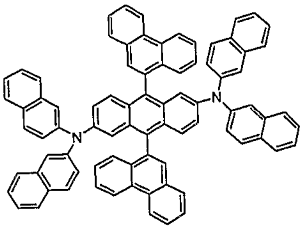

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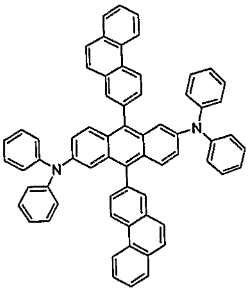

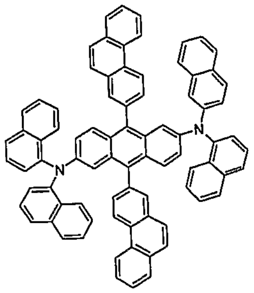

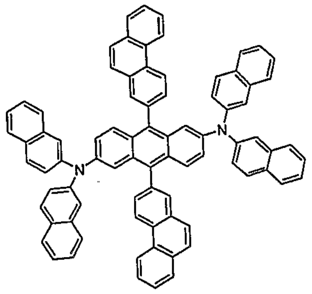

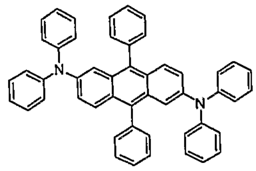

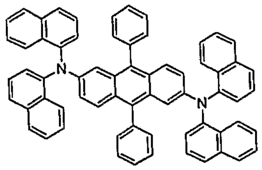

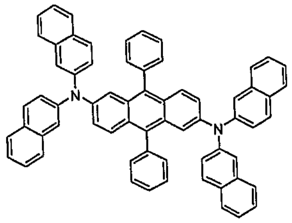

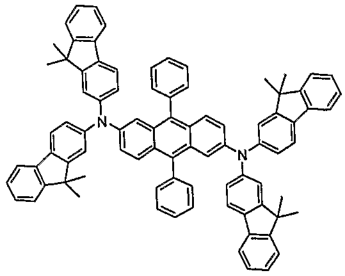

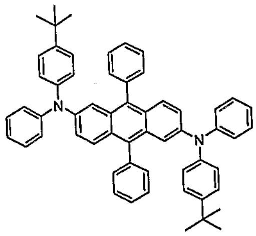

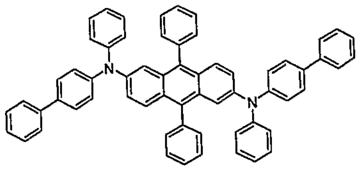

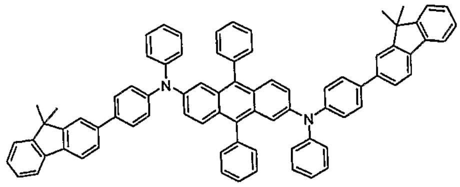

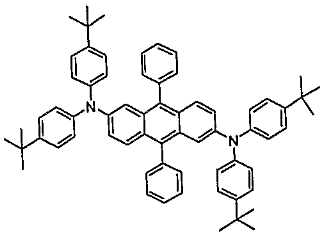

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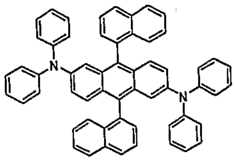

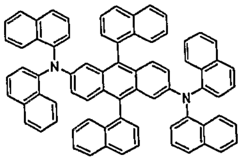

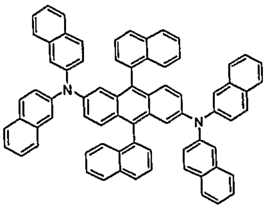

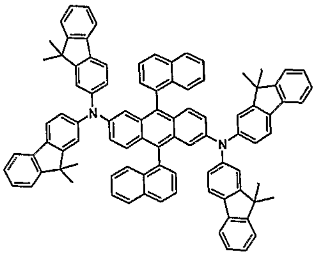

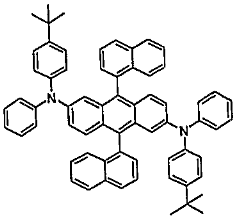

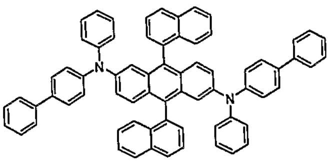

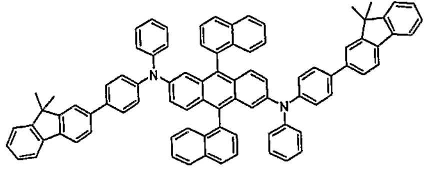

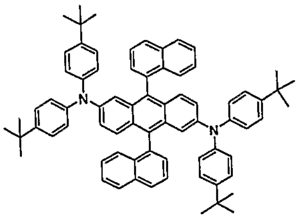

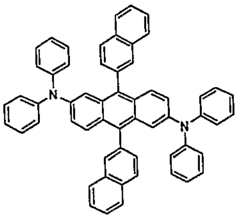

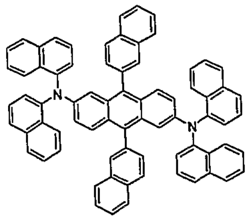

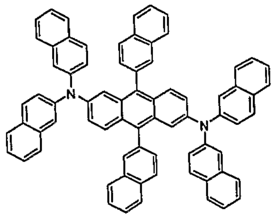

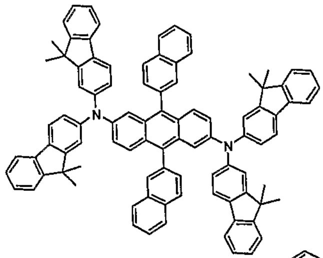

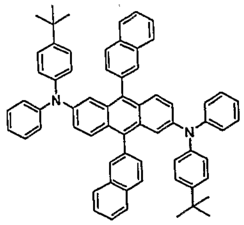

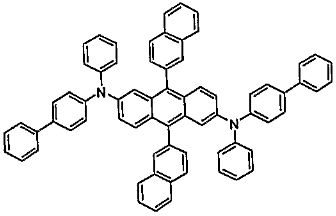

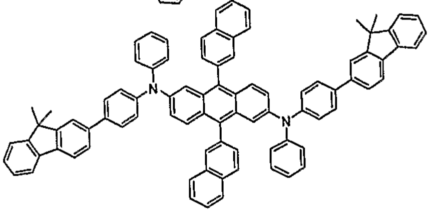

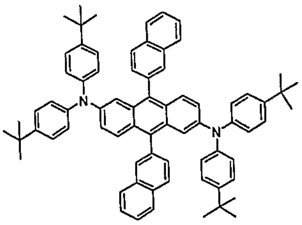

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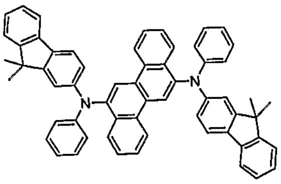
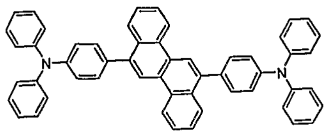
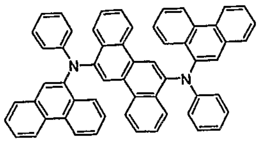
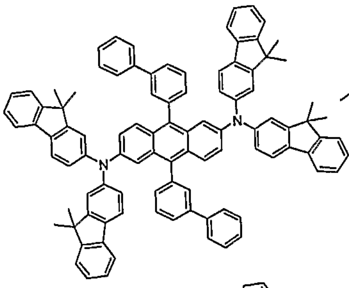
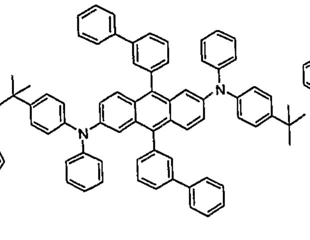
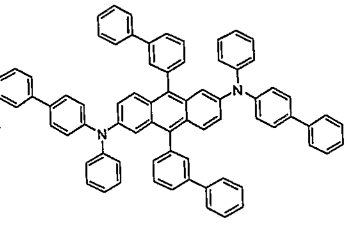
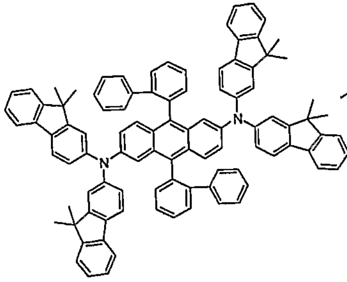
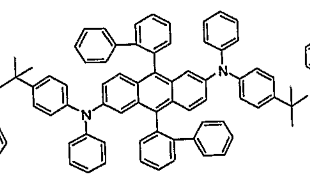
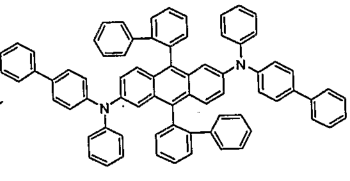
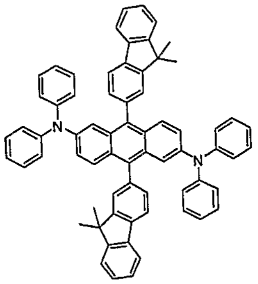
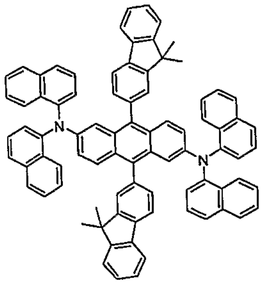
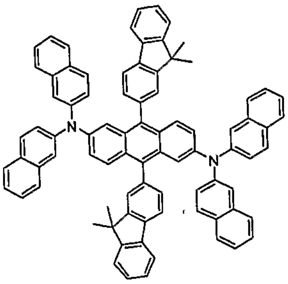
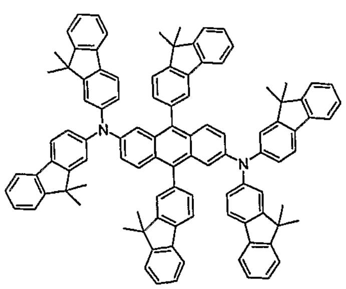
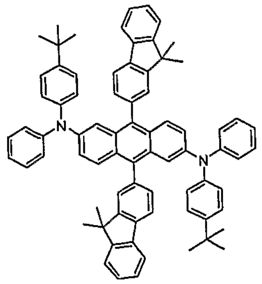
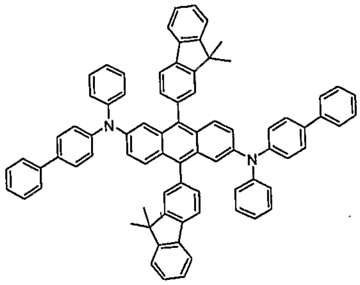

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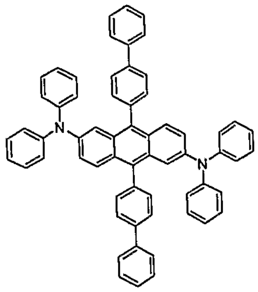

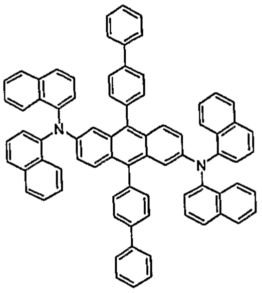

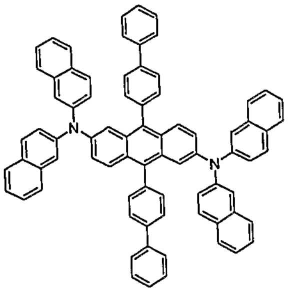

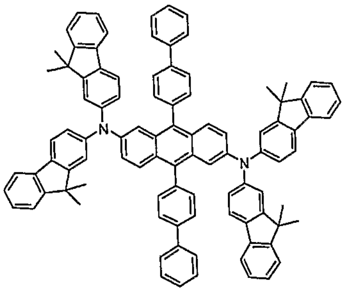

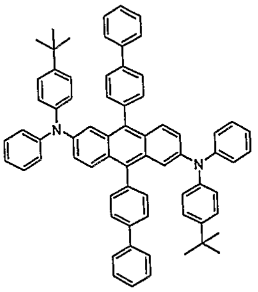

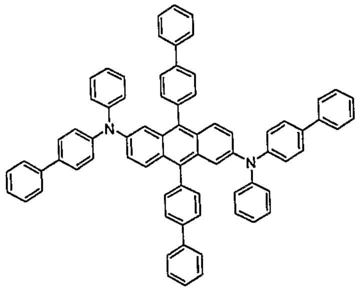

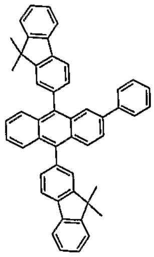

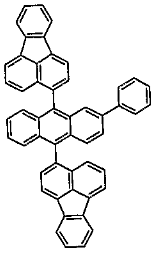

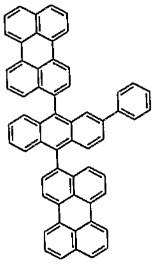

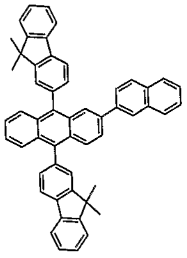

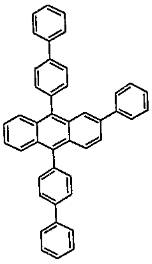

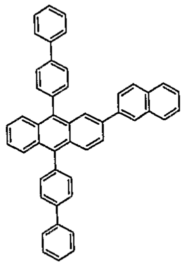

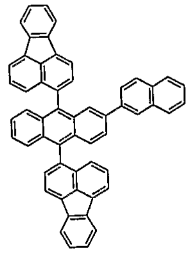

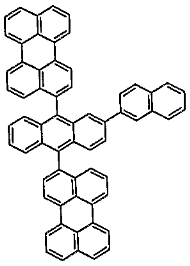

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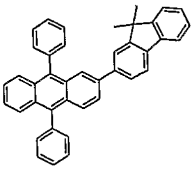
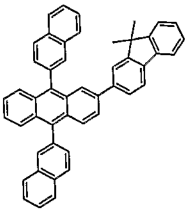
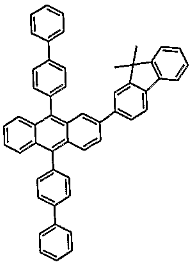
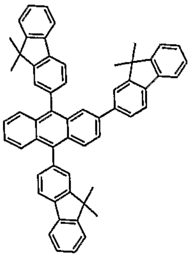
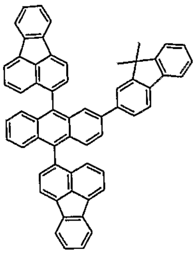
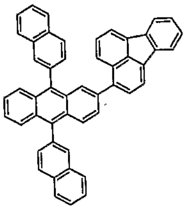
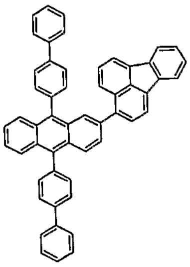
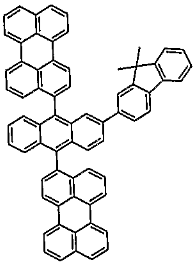
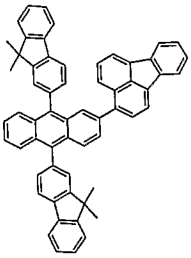
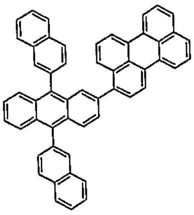
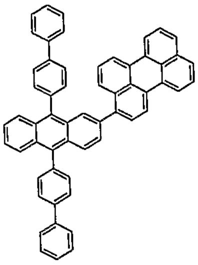
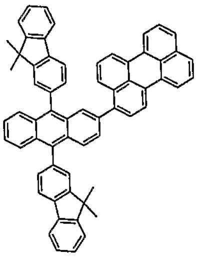
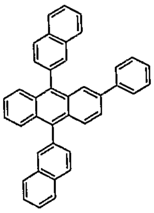
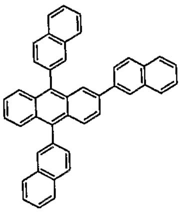
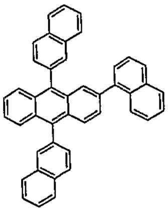
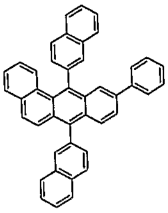
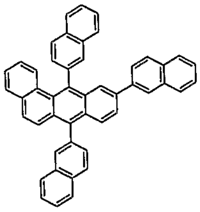
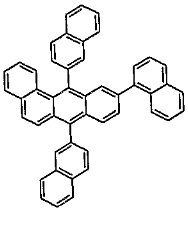
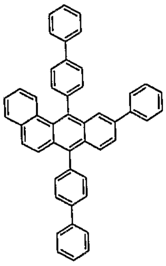
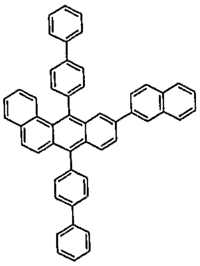
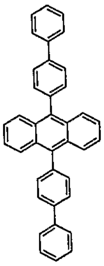
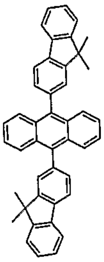
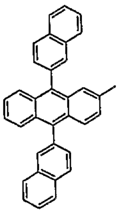

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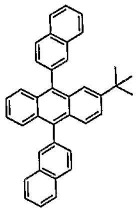
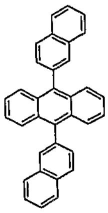
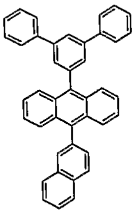
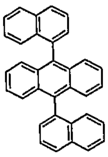
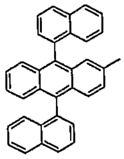
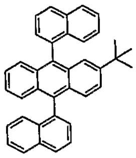
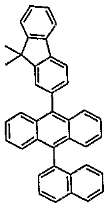
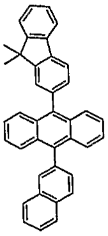
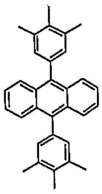
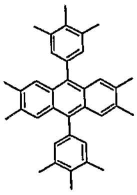
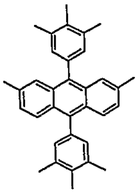
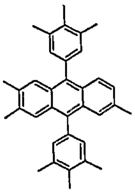
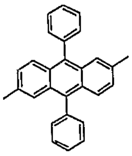
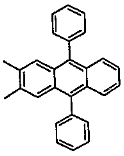
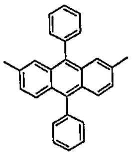
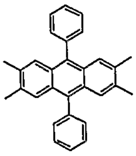
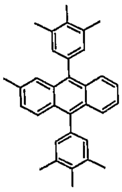
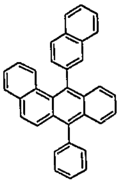
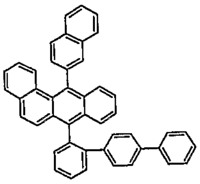
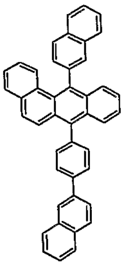
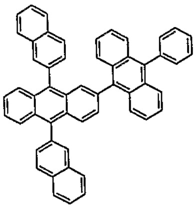
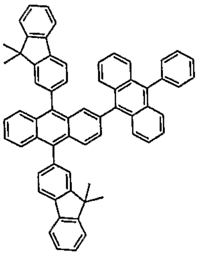
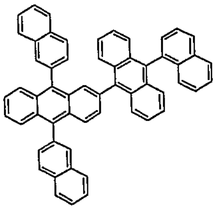
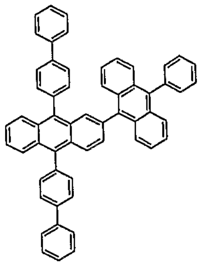
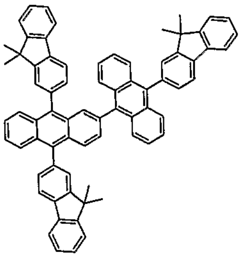
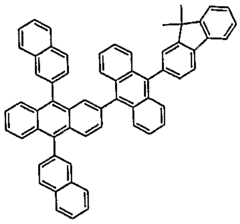

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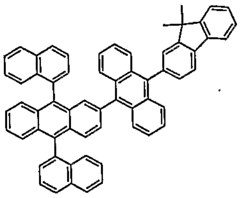

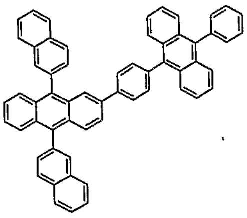

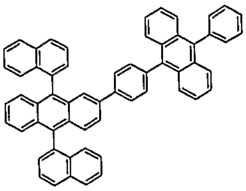

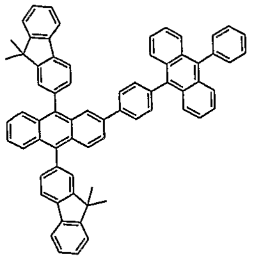

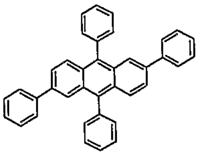

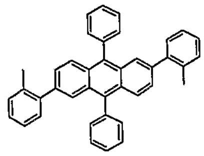

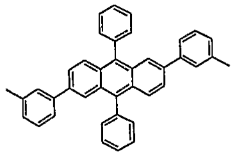

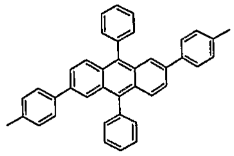

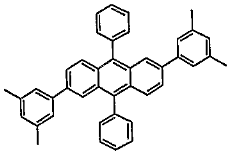

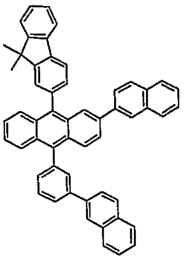

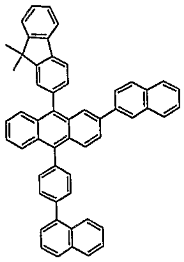

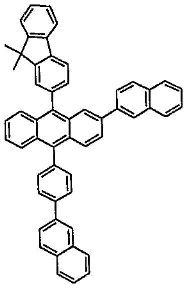

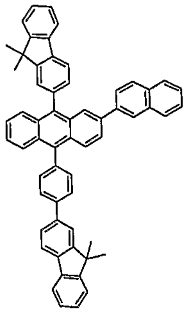

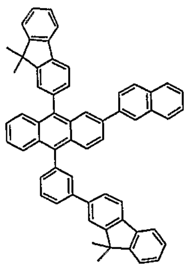

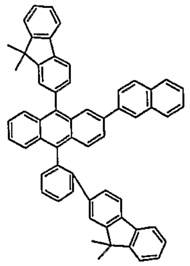

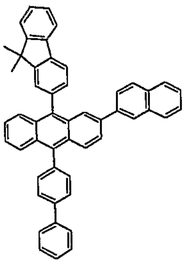

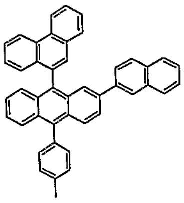

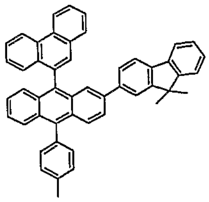

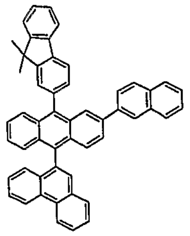

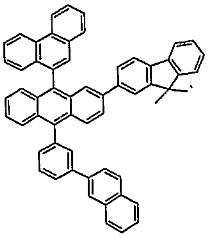

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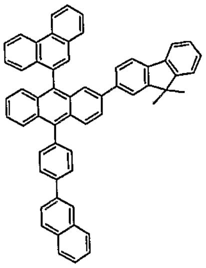
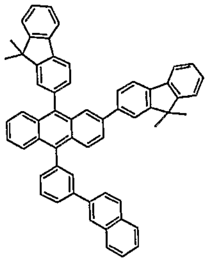
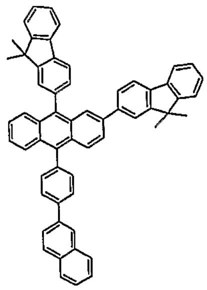
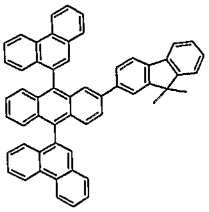
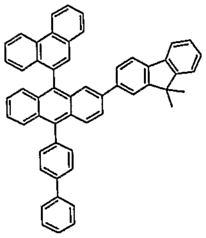
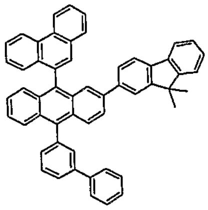
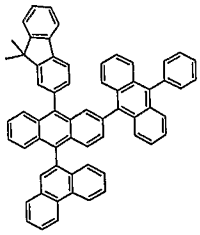
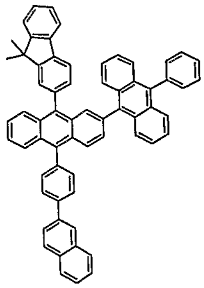
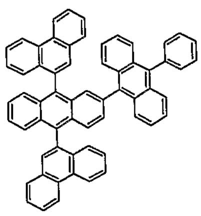
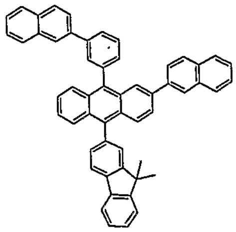
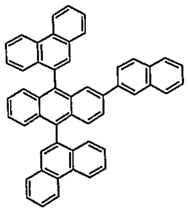
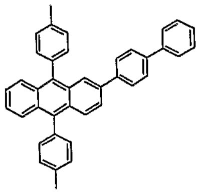
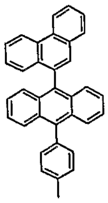
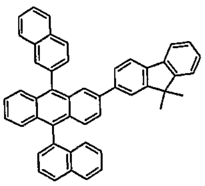
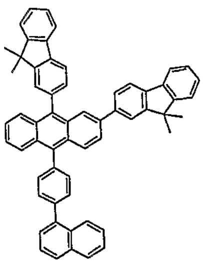
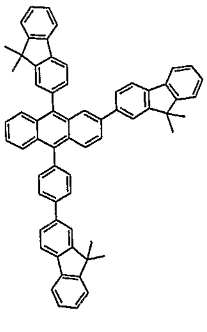
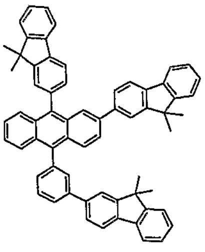
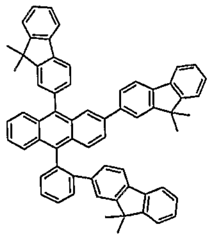

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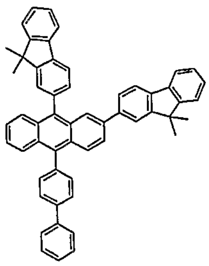
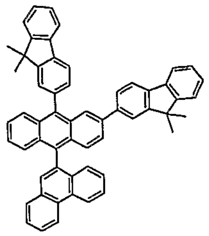
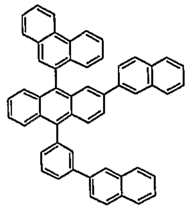
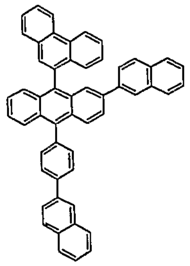
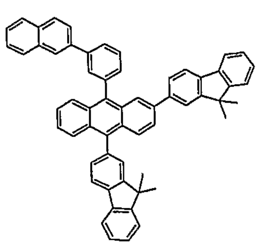
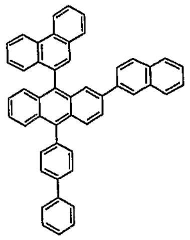
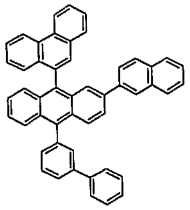
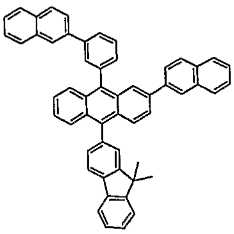
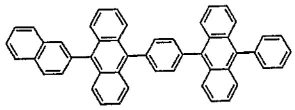
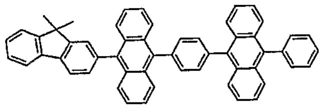
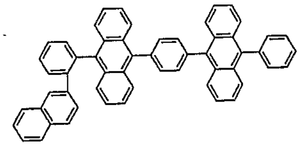
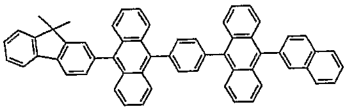
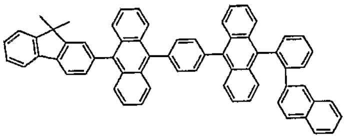
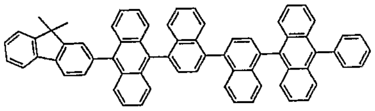
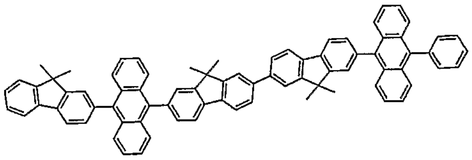
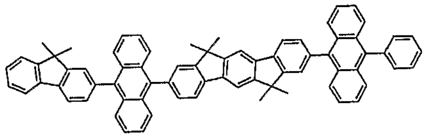
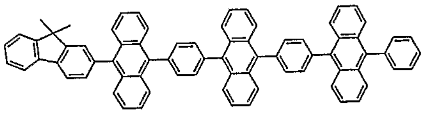
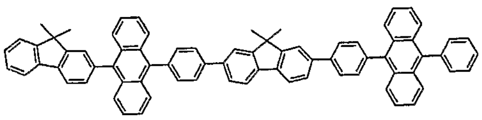

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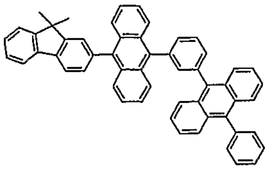
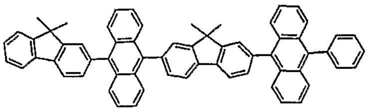
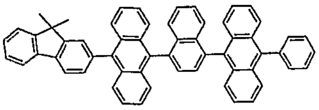
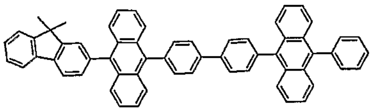
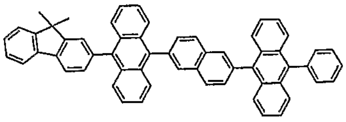
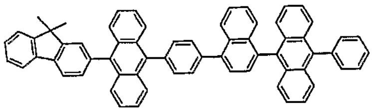
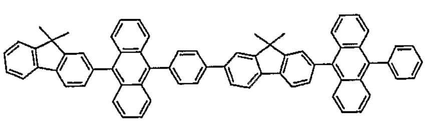
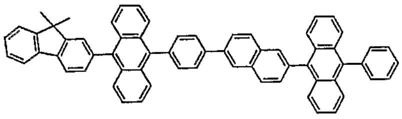
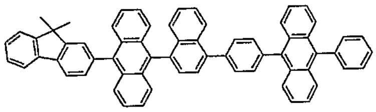
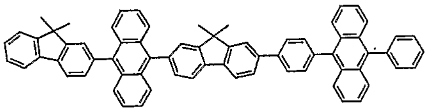
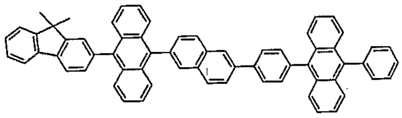
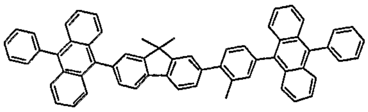
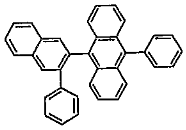
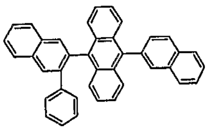
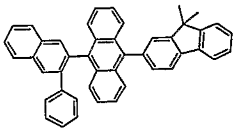
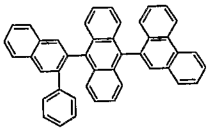
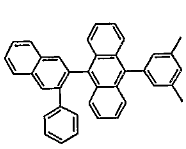
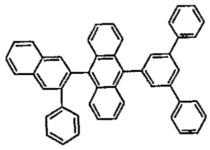
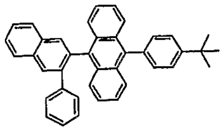
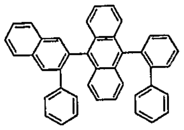
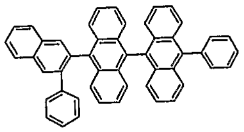
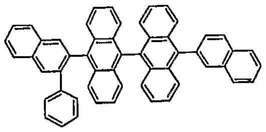
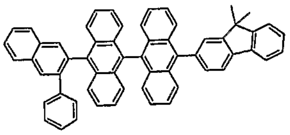

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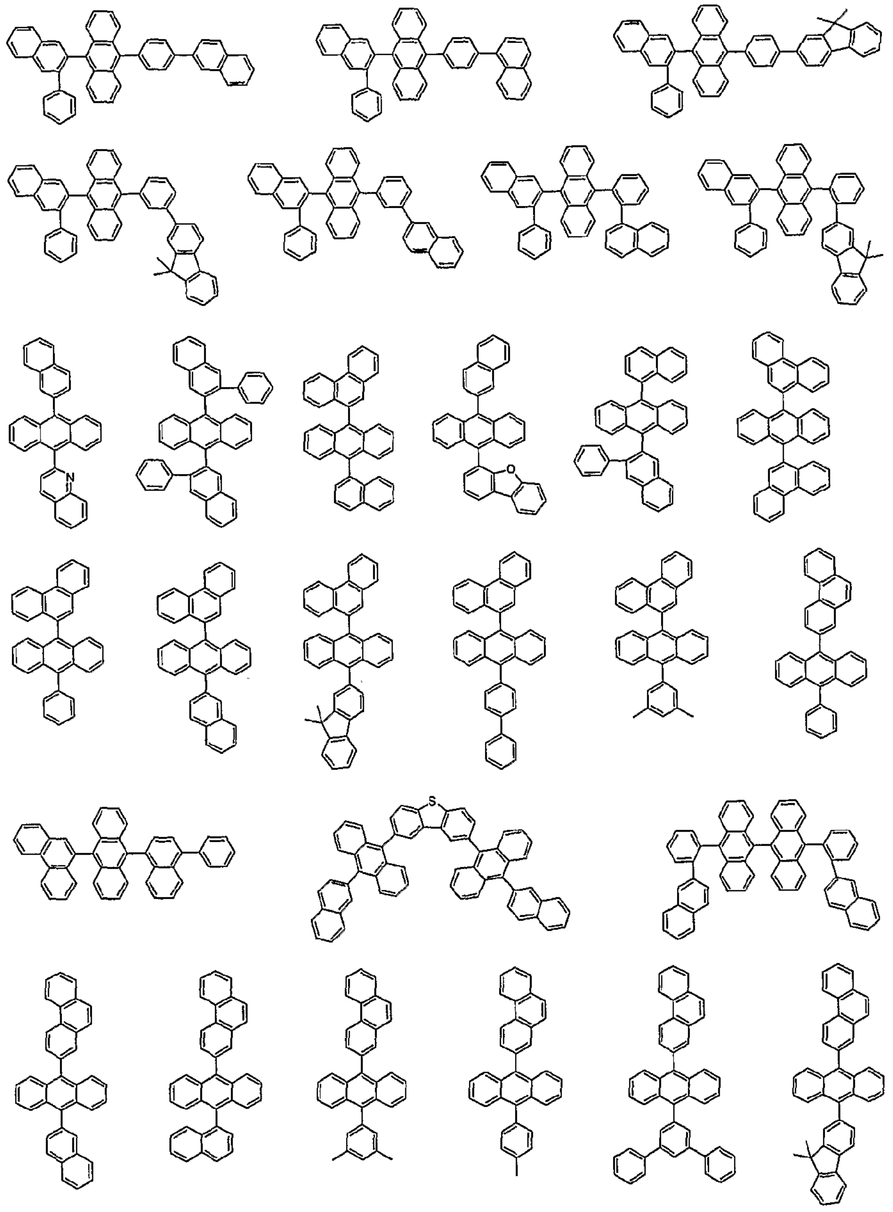

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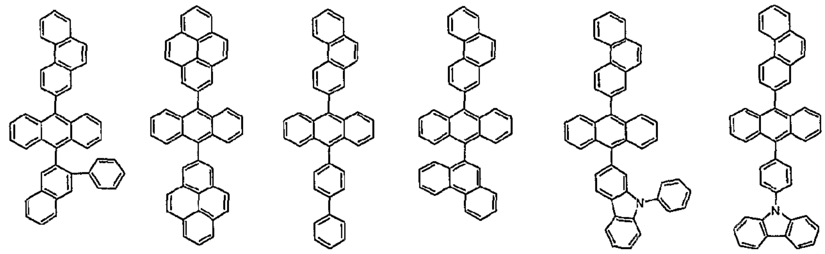


<242>

<243> In an organic electronic device according to the present invention, it is preferable to place one or more layer(s) (here-in-below, referred to as the surface layer) selected from chalcogenide layers, metal halide layers and

metal oxide layers, on the inner surface of at least one side of the pair of electrodes. Specifically, it is preferable to arrange a chalcogenide layer of silicon and aluminum metal (including oxides) on the anode surface of the EL medium layer, and a metal halide layer or a metal oxide layer on the cathode surface of the EL medium layer. As the result, stability in operation can be obtained.

244> Examples of chalcogenides preferably include SiO_x (1=X=2), AlO_x (1=X=1.5), SiON, SiAlON, or the like. Examples of metal halides preferably include LiF, MgF_2, CaF_2, fluorides of rare earth metal, or the like. Examples of metal oxides preferably include Cs_2O, Li_2O, MgO, SrO, BaO, CaO, or the like.

<245> In an organic electronic device according to the present invention, it is also preferable to arrange, on at least one surface of the pair of electrodes thus manufactured, a mixed region of electron transport compound and a reductive dopant, or a mixed region of a hole transport compound with an oxidative dopant. Accordingly, the electron transport compound is reduced to an anion, so that injection and transportation of electrons from the mixed region to an EL medium are facilitated. In addition, since the hole transport compound is oxidized to form a cation, injection and transportation of holes from the mixed region to an EL medium are facilitated. Preferable oxidative dopants include various Lewis acids and acceptor compounds. Preferable reductive dopants include alkali metals, alkali metal compounds, alkaline earth metals, rare-earth metals, and mixtures thereof.

【Advantageous Effects】

247> The compounds for organic electronic material according to the invention exhibit high luminous efficiency and excellent life property of material, so that OLED's having very good operation life of device can be advantageously manufactured therefrom. The compounds for organic electronic material according to the invention can be contained in a hole transport layer or a hole injecting layer, or employed as host for phosphor to result in lowered operation voltage, thus providing advantages of noticeably decreased power consumption while exhibiting at least comparable luminous efficiency.

【Description of Drawings】

<248> Fig. 1 is a cross-sectional view of an OLED.

<249> <Description of symbols of significant parts of the drawing>

<250> 1: Glass
<251> 2: Transparent electrode
<252> 3: Hole injecting layer
<253> 4: Hole transport layer
<254> 5: Electroluminescent layer
<255> 6: Electron transport layer
<256> 7: Electron injecting layer
<257> 8: Al cathode

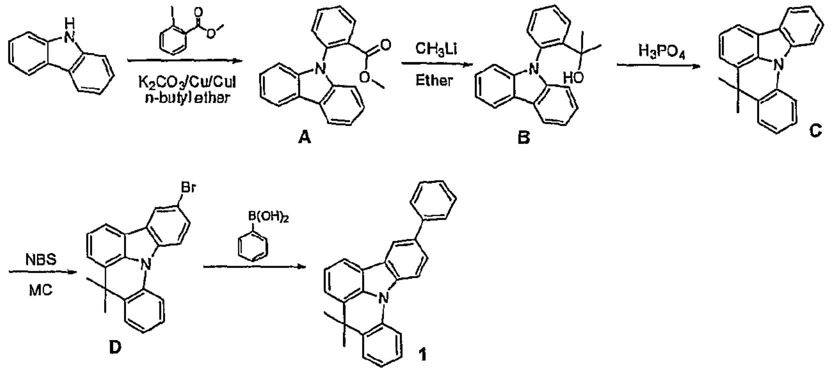
【Best Mode】

<258> The present invention is further described with respect to the representative compounds of the invention, by describing the compounds for organic electronic material, the processes for preparing the same, and electroluminescent properties of the device manufactured therefrom in the Examples below, which are provided for illustration of the embodiments only but are not intended to limit the scope of the invention by any means.

<259>

<260> [Preparation Examples]

261> [Preparation Example 1] Preparation of Compound (1)



<262>

<263> Preparation of Compound (A)

<264> Carbazole (20 g, 119.6 mmmol), methyl-2-iodobenzoate (26.4 mL, 179.4 mmol), K_2CO_3 (21.5 g, 155.5 mmol), Cu (1.52 g, 23.9 mmol) and CuI (1.14 g, 5.98 mmol) were dissolved in dibutyl ether (500 mL), and the solution was stirred under reflux for 48 hours in the presence of argon atmosphere. When the reaction was completed, the reaction mixture was cooled to room temperature, and extracted with water (800 mL). The organic layer was evaporated under reduced pressure. The residue was purified via column chromatography by using hexane and ethyl acetate (4:1), and recrystallized from ethanol (300 mL) to obtain Compound (A) (24.5 g, 68%).

<265>

<266> Preparation of Compound (B)

<267> Compound (A) (15.0 g, 49.8 mmol) was dissolved in ether (100 mL), and the solution was chilled to -78℃. Methyl lithium (1.6 M in ether, 78 mL, 124.4 mmol) was added thereto, and the mixture stirred for 1 hour. The reaction mixture was slowly warmed to room temperature, and further stirred for 4 hours. When the reaction was completed, the mixture was extracted with water (200 mL), and the organic layer was evaporated under reduced pressure. Recrystallization from ethanol/acetone (1:1 v/v) gave Compound (B) (10.1 g, 67%).

<268>

<269> Preparation of Compound (C)

270> Compound (B) (14.0 g, 46.5 mmol) was dissolved in concentrated H_3PO_4 (150 mL), and the solution was stirred for 5.5 hours. The reaction mixture was extracted with water (200 mL) and ethyl acetate (200 mL), and the organic layer was evaporated under reduced pressure. Recrystallization from ethanol (150 mL) gave Compound (C) (9.48 g, 72%).

<271>

<272> Preparation of Compound (D)

<273> Compound (C) (7 g, 24.7 mmol) was dissolved in dichloromethane (100 mL), and N-bromosuccinimide (5.28 g, 29.6 mmol) was added thereto at 0℃. The solution was stirred for 4 hours, while maintaining the temperature. Then the reaction was quenched by adding distilled water (150 mL), and the mixture was extracted with dichloromethane (100 mL), and the extract was evaporated under reduced pressure. Recrystallization from ethanol/acetone (1:2 v/v) gave Compound (D) (6.4 g, 72%).

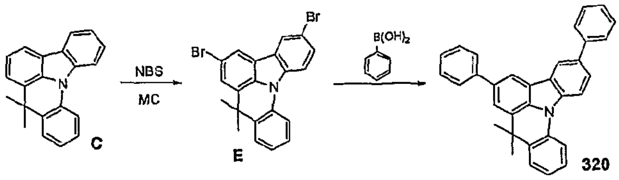
<274>

<275> Preparation of Compound (1)

<276> Compound (D) (5 g, 13.8 mmol), phenylboronic acid (1.9 g, 15.18 mmol) and $Pd(PPh_3)_4$ (0.8 g, 0.52 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL), and aqueous 2 M sodium carbonate solution (50 mL) was added thereto. After stirring under reflux at 120℃ for 4 hours, the reaction mixture was cooled to 25℃, and the reaction was quenched by adding distilled water (200 mL). The mixture was extracted with ethyl acetate (150 mL), and the extract was evaporated under reduced pressure. Purification via column chromatography gave the target compound (Compound 1) (1.6 g, 3.33 mmol).

<277>

<278> [Preparation Example 2] Preparation of Compound (320)



<279>

<280> Preparation of Compound (E)

<281> Compound (C) (7 g, 24.7 mmol) was dissolved in dichloromethane (100 mL), and N-bromosuccinimide (10.5 g, 59.2 mmol) was added thereto at 0℃. The solution was stirred for 5 hours, while maintaining the temperature. Then the reaction was quenched by adding distilled water (150 mL), and the mixture was extracted with dichloromethane (100 mL), and the extract was evaporated under reduced pressure. Recrystallization from ethanol/acetone (1:2 v/v) gave Compound (E) (7.4 g, 68%).

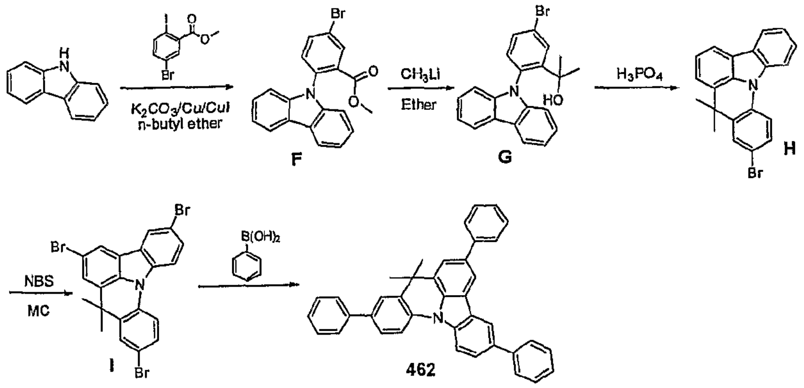
<282>

<283> Preparation of Compound (320)

<284> Compound (E) (5 g, 13.8 mmol), phenylboronic acid (3.8 g, 30.36 mmol) and $Pd(PPh_3)_4$ (1.6 g, 1.04 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL), and aqueous 2 M sodium carbonate solution (50 mL) was added thereto. After stirring under reflux at 120℃ for 4 hours, the reaction mixture was cooled to 25℃, and the reaction was quenched by adding distilled water (200 mL). The mixture was extracted with ethyl acetate (150 mL), and the extract was evaporated under reduced pressure. Purification via column chromatography gave the target compound (Compound 320) (3.9 g, 8.95 mmol).

<285>

<286> [Preparation Example 3] Preparation of Compound (4642)



<287>

<288> Preparation of Compound (F)

<289> Carbazole (20 g, 119.6 mmmol), 5-bromomethyl-2-iodobenzoate (26.4 mL, 179.4 mmol), K_2CO_3 (21.5 g, 155.5 mmol), Cu (1.52 g, 23.9 mmol) and CuI (1.14 g, 5.98 mmol) were dissolved in dibutyl ether (500 mL), and the solution was

stirred under reflux for 48 hours in the presence of argon atmosphere. When the reaction was completed, the reaction mixture was cooled to room temperature, and extracted with water (800 mL). The organic layer was evaporated under reduced pressure. The residue was purified via column chromatography by using hexane and ethyl acetate (4:1), and recrystallized from ethanol (300 mL) to obtain Compound (F) (24.5 g, 58%).

290>

:291> <u>Preparation of Compound (G)</u>

:292> Compound (F) (15.0 g, 49.8 mmol) was dissolved in ether (100 mL), and the solution was chilled to -78℃. Methyl lithium (1.6 M in ether, 78 mL, 124.4 mmol) was added thereto, and the mixture stirred for 1 hour. The reaction mixture was slowly warmed to room temperature, and further stirred for 4 hours. When the reaction was completed, the mixture was extracted with water (200 mL), and the organic layer was evaporated under reduced pressure. Recrystallization from ethanol/acetone (1:1 v/v) gave Compound (G) (10.1 g, 57%).

<293>

<294> <u>Preparation of Compound (H)</u>

<295> Compound (G) (14.0 g, 46.5 mmol) was dissolved in concentrated H_3PO_4 (150 mL), and the solution was stirred for 5.5 hours. The reaction mixture was extracted with water (200 mL) and ethyl acetate (200 mL), and the organic layer was evaporated under reduced pressure. Recrystallization from ethanol (150 mL) gave Compound (H) (9.48 g, 62%).

<296>

<297> <u>Preparation of Compound (I)</u>

<298> Compound (H) (7 g, 24.7 mmol) was dissolved in dichloromethane (100 mL), and N-bromosuccinimide (5.28 g, 29.6 mmol) was added thereto at 0℃. The solution was stirred for 4 hours, while maintaining the temperature. Then the reaction was quenched by adding distilled water (150 mL), and the mixture was extracted with dichloromethane (100 mL), and the extract was evaporated under reduced pressure. Recrystallization from ethanol/acetone

(1:2 v/v) gave Compound (I) (6.4 g, 62%).

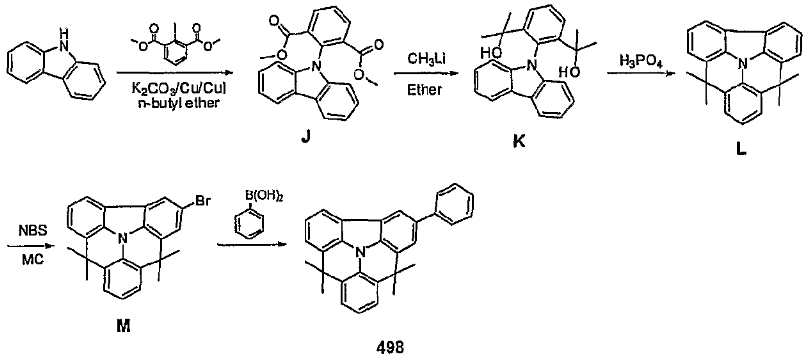
<299>

<300> Preparation of Compound (462)

<301> Compound (I) (5 g, 13.8 mmol), phenylboronic acid (5.7 g, 45.54 mmol) and $Pd(PPh_3)_4$ (2.4 g, 1.56 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL), and aqueous 2 M sodium carbonate solution (50 mL) was added thereto. After stirring under reflux at 120℃ for 4 hours, the reaction mixture was cooled to 25℃, and the reaction was quenched by adding distilled water (200 mL). The mixture was extracted with ethyl acetate (150 mL), and the extract was evaporated under reduced pressure. Purification via column chromatography gave the target compound (Compound 462) (1.6 g, 3.12 mmol).

<302>

<303> [Preparation Example 4] Preparation of Compound (498)



<304>

<305> Preparation of Compound (J)

<306> Carbazole (20 g, 119.6 mmmol), dimethyl-2-iodoisophthalate (49.8 g, 155.5 mmol), K_2CO_3 (21.5 g, 155.5 mmol), Cu (1.52 g, 23.9 mmol) and CuI (1.14 g, 5.98 mmol) were dissolved in dibutyl ether (800 mL), and the solution was stirred under reflux for 48 hours in the presence of argon atmosphere. When the reaction was completed, the reaction mixture was cooled to room temperature, and extracted with water (800 mL). The organic layer was evaporated under reduced pressure. The residue was purified via column chromatography by using hexane and ethyl acetate (4:1), and recrystallized from ethanol (300 mL) to obtain Compound (J) (27.1 g, 63%).

<307>

<308> Preparation of Compound (K)

<309> Compound (J) (15.0 g, 41.7 mmol) was dissolved in ether (300 mL), and the solution was chilled to -78℃. Methyl lithium (1.6 M in ether, 120 mL, 187.8 mmol) was added thereto, and the mixture stirred for 1 hour. The reaction mixture was slowly warmed to room temperature, and further stirred for 4 hours. When the reaction was completed, the mixture was extracted with water (200 mL), and the organic layer was evaporated under reduced pressure. Recrystallization from ethanol/acetone (1:1 v/v) gave Compound (K) (8.7 g, 58%).

<310>

<311> Preparation of Compound (L)

<312> Compound (K) (14.0 g, 38.9 mmol) was dissolved in concentrated H_3PO_4 (150 mL), and the solution was stirred for 5.5 hours. The reaction mixture was extracted with water (200 mL) and ethyl acetate (200 mL), and the organic layer was evaporated under reduced pressure. Recrystallization from ethanol (150 mL) gave Compound (L) (7.68 g, 61%).

<313>

<314> Preparation of Compound (M)

<315> Compound (L) (7 g, 21.6 mmol) was dissolved in dichloromethane (100 mL), and N-bromosuccinimide (5.28 g, 28.1 mmol) was added thereto at 0℃. The solution was stirred for 4 hours, while maintaining the temperature. Then the reaction was quenched by adding distilled water (150 mL), and the mixture was extracted with dichloromethane (100 mL), and the extract was evaporated under reduced pressure. Recrystallization from ethanol/acetone (1:2 v/v) gave Compound (M) (5.7 g, 66%).

<316>

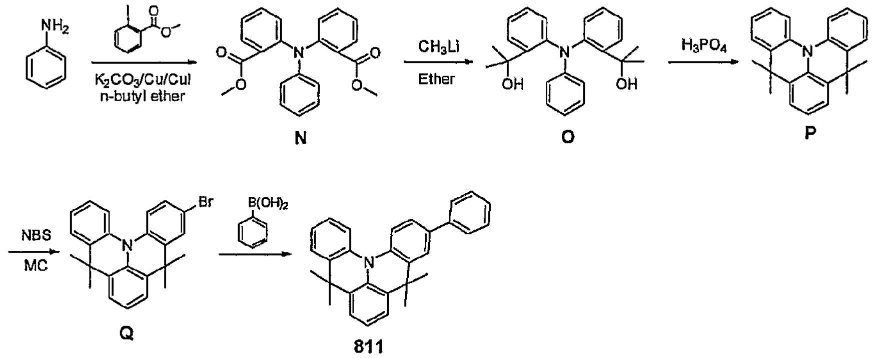
<317> Preparation of Compound (498)

<318> Compound (M) (5 g, 12.4 mmol), phenylboronic acid (1.9 g, 15.18 mmol) and $Pd(PPh_3)_4$ (0.8 g, 0.52 mmol) were dissolved in toluene (100 mL) and

ethanol (50 mL), and aqueous 2 M sodium carbonate solution (50 mL) was added thereto. After stirring under reflux at 120℃ for 4 hours, the reaction mixture was cooled to 25℃, and the reaction was quenched by adding distilled water (200 mL). The mixture was extracted with ethyl acetate (150 mL), and the extract was evaporated under reduced pressure. Purification via column chromatography gave the target compound (Compound 498) (1.5 g, 3.75 mmol).

319>

320> [Preparation Example 5] Preparation of Compound (811)



321>

322> Preparation of Compound (N)

323> A reaction vessel was charged with aniline (4.89 mL, 53.7 mmol), methyl-2-iodobenzoate (23.7 mL, 161 mmol), K_2CO_3 (15.6 g, 113 mmol), Cu (0.68 g, 10.7 mmol), CuI (0.51 g, 2.69 mmol) and di-n-butyl ether (50 mL), and the mixture was stirred under reflux for 48 hours in the presence of argon atmosphere. The organic product was purified via column chromatography by using hexane and ethyl acetate (4:1), and recrystallized from ethanol to obtain Compound (N) (15.7 g, 81%).

324>

325> Preparation of Compound (O)

326> Compound (N) (15.0 g, 41.5 mmol) was dissolved in ether (80 mL), and methyl lithium (in ether, 45 mmol) was added thereto at -78℃. The mixture was slowly warmed to ambient temperature, and reacted for 4 hours. Recrystallization from ethanol/acetone (1:1 v/v) gave Compound (O) (7.68 g, 61%).

327>

328> Preparation of Compound (P)

329> Compound (O) (14.0 g, 38.7 mmol) was added to concentrated H_3PO_4 (150 mL), and the mixture was stirred for 5.5 hours. The reaction mixture was extracted with water/ethyl acetate, and the organic product was recrystallized from ethanol to obtain Compound (P) (7.8 g, 68%).

330>

331> Preparation of Compound (Q)

332> Compound (P) (7 g, 21.5 mmol) was dissolved in methylene chloride, and N-bromosuccinimide (NBS) (4.98 g, 27.95 mmol) was added thereto at 0℃. After 5 hours, the reaction mixture was extracted and recrystallized from ethanol/acetone (1:2 v/v) to obtain Compound (Q) (6 g, 75%).

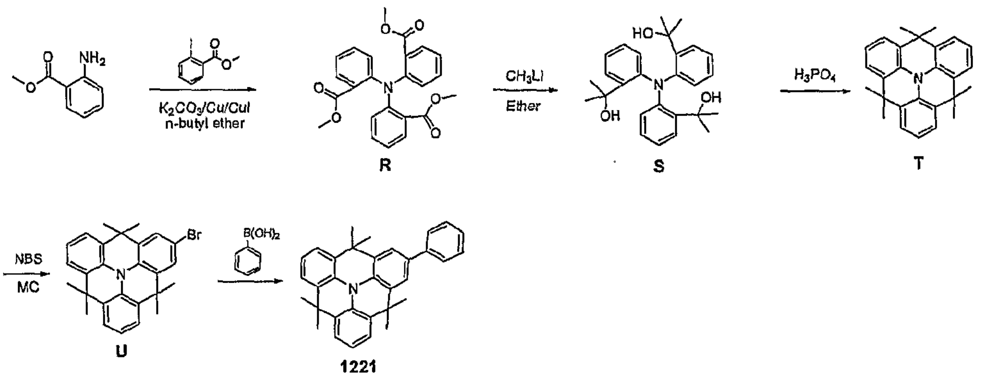
<333>

<334> Preparation of Compound (811)

<335> Compound (Q) (5 g, 12.4 mmol), phenylboronic acid (1.9 g, 15.18 mmol) and $Pd(PPh_3)_4$ (0.8 g, 0.52 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL), and aqueous 2 M sodium carbonate solution (50 mL) was added thereto. After stirring under reflux at 120℃ for 4 hours, the reaction mixture was cooled to 25℃, and the reaction was quenched by adding distilled water (200 mL). The mixture was extracted with ethyl acetate (150 mL), and the extract was evaporated under reduced pressure. Purification via column chromatography gave the target compound (Compound 811) (1.5 g, 3.75 mmol).

<336>

<337> [Preparation Example 6] Preparation of Compound (1221)



<338>

<339> Preparation of Compound (R)

<340> A reaction vessel was charged with anthranilic acid methyl ester (10 g, 66.2 mmol), methyl-2-iodobenzoate (28.2 mL, 191.98 mmol), K_2CO_3 (19.2 g, 139.02 mmol), Cu (0.84 g, 13.24 mmol), CuI (0.63 g, 3.31 mmol) and di-n-butyl ether (120 mL), and the mixture was stirred under reflux for 48 hours in the presence of argon atmosphere. The organic product was purified via column chromatography by using hexane and ethyl acetate (4:1), and recrystallized from ethanol to obtain Compound (R) (21.7 g, 78%).

<341>

<342> Preparation of Compound (S)

<343> Compound (R) (15.0 g, 35.8 mmol) was dissolved in ether (100 mL), and methyl lithium (1.6 M in ether, 145 mL, 232.46 mmol) was added thereto at -78 ℃. The mixture was slowly warmed to room temperature, and continuously reacted for 4 hours. Recrystallization from ethanol/acetone (1:1 v/v) gave Compound (S) (10.4 g, 69%).

<344>

<345> Preparation of Compound (T)

<346> Compound (S) (14.0 g, 33.4 mmol) was added to concentrated H_3PO_4 (150 mL), and the mixture was stirred for 5.5 hours. The reaction mixture was extracted with water/ethyl acetate, and the organic product was recrystallized from ethanol to obtain Compound (T) (9.15 g, 75%).

<347>

348> Preparation of Compound (U)

349> Compound (T) (7 g, 19.2 mmol) was dissolved in methylene chloride, and N-bromosuccinimide (NBS) (4.09 g, 23.0 mmol) was added thereto at 0℃. After 5 hours, the reaction mixture was extracted by using water and ethyl acetate, and the organic product was recrystallized from ethanol/acetone (1:2 v/v) to obtain Compound (U) (6.4 g, 75%).

<350>

<351> Preparation of Compound (1221)

<352> Compound (U) (5 g, 11.3 mmol), phenylboronic acid (1.9 g, 15.18 mmol) and $Pd(PPh_3)_4$ (0.8 g, 0.52 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL), and aqueous 2 M sodium carbonate solution (50 mL) was added thereto. After stirring under reflux at 120℃ for 4 hours, the reaction mixture was cooled to 25℃, and the reaction was quenched by adding distilled water (200 mL). The mixture was extracted with ethyl acetate (150 mL), and the extract was evaporated under reduced pressure. Purification via column chromatography gave the target compound (Compound 1221) (1.5 g, 3.75 mmol).

<353>

<354> Organic electroluminescent compounds (Compounds 1 to 1528) were prepared according to the procedure described in Preparation Examples 1 to 6, and the ^1H NMR and MS/FAB data of those compounds are shown in Table 1.

<355> [Table 1]

화합물	^{1}H NMR(CDCl$_3$, 200 MHz)	MS/FAB	
		found	calculated
1	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.41(3H, m), 7.51~7.52(4H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.37(1H, m)	359.46	359.17
4	δ = 1.72(12H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(3H, m), 7.37~7.4(3H, m), 7.55(1H, m), 7.63(1H, m), 7.69(1H, m), 7.77(2H, m), 7.87~7.93(3H, m), 8.37(1H, m)	475.62	475.23
16	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.41(3H, m), 7.48~7.57(7H, m), 7.69~7.7(2H, m), 7.77(1H, m), 7.87(1H, m), 8.37(1H, m)	435.56	435.20
28	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.41(3H, m), 7.51(2H, m), 7.59(2H, m), 7.69(1H, m), 7.77~7.79(3H, m), 7.87(1H, m), 8(2H, m), 8.37~8.4(3H, m)	485.62	485.21
35	δ = 1.72(6H, s), 6.95(1H, m), 7.17~7.3(7H, m), 7.37~7.5(5H, m), 7.58~7.59(3H, m), 7.69(1H, m), 7.77(1H, m), 7.85~7.87(3H, m), 8.37(1H, m), 8.56(1H, m)	551.68	551.24
38	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.25~7.3(4H, m), 7.37~7.4(2H, m), 7.53(2H, m), 7.69(1H, m), 7.77(1H, m), 7.85~7.87(3H, m), 8.01(1H, m), 8.18(1H, m), 8.37(1H, m)	492.63	492.17
49	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.25~7.4(7H, m), 7.5(1H, m), 7.63~7.69(4H, m), 7.77~7.79(3H, m), 7.87(1H, m), 7.94(1H, m), 8.12(1H, m), 8.37(1H, m), 8.55(1H, m)	524.65	524.23
50	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.25~7.33(9H, m), 7.58(2H, m), 7.69(2H, m), 7.77(2H, m), 7.87(2H, m), 7.94(1H, m), 8.37(1H, m), 8.55(1H, m)	524.65	524.23
72	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.36~7.42(5H, m), 7.48(1H, m), 7.69~7.87(8H, m), 8.03~8.12(3H, m), 8.37(1H, m)	541.62	541.20
91	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.25~7.3(6H, m), 7.37~7.4(2H, m), 7.55(2H, m), 7.61(1H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.04~8.08(2H, m), 8.37~8.42(2H, m), 8.55(1H, m)	485.62	485.21
94	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.4(2H, m), 7.48(2H, m), 7.57~7.59(4H, m), 7.69~7.77(4H, m), 7.87~7.92(2H, m), 8(2H, m), 8.37(1H, m)	485.62	485.21
104	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.41(3H, m), 7.51~7.52(4H, m), 7.58(2H, m), 7.69~7.77(4H, m), 7.87~7.92(3H, m), 8.37(1H, m)	485.62	485.21

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106	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.41(3H, m), 7.51~7.55(4H, m), 7.69(1H, m), 7.77~7.79(3H, m), 7.87(1H, m), 8.01(2H, m), 8.37(1H, m), 8.55(2H, m)	485.62	485.21
112	δ = 1.72(6H, s), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.4(6H, m), 7.58~7.59(3H, m), 7.69~7.77(3H, m), 7.87~7.92(6H, m), 8(2H, m), 8.37(1H, m)	585.73	585.25
119	δ = 1.72(6H, s), 2.34(12H, s), 6.36(4H, m), 6.71~6.77(4H, m), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.4(3H, m), 8.37(1H, m)	506.68	506.27
132	δ = 1.72(12H, s), 6.58~6.63(3H, m), 6.75~6.81(4H, m), 6.95(1H, m), 7.17~7.3(6H, m), 7.37~7.4(4H, m), 7.55(1H, m), 7.62(1H, m), 7.87(1H, m), 8.37(1H, m)	566.73	566.27
146	δ = 1.72(6H, s), 6.69~6.77(4H, m), 6.95~6.98(2H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.41(5H, m), 7.51~7.57(9H, m), 8.02~8.07(2H, m), 8.37(1H, m)	576.73	576.26
158	δ = 1.72(12H, s), 6.58(1H, m), 6.75~6.77(3H, m), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(3H, m), 7.36~7.4(5H, m), 7.49~7.55(3H, m), 7.62(1H, m), 7.74~7.77(2H, m), 7.84~7.88(3H, m), 8.37(1H, m)	616.79	616.29
171	δ = 1.35(9H, s), 1.72(12H, s), 6.55~6.58(3H, m), 6.75~6.77(3H, m), 6.95~7.01(3H, m), 7.17(1H, m), 7.26~7.3(3H, m), 7.37~7.4(4H, m), 7.55(1H, m), 7.62(1H, m), 7.87(1H, m), 8.37(1H, m)	622.84	622.33
235	δ = 1.72(6H, s), 6.62(1H, m), 6.7~6.77(3H, m), 6.95~6.99(3H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.37~7.4(3H, m), 7.55(1H, m), 8.07(1H, m), 8.37(1H, m), 8.46(2H, m)	452.55	452.20
261	δ = 1.72(6H, s), 6.63(4H, m), 6.69(2H, m), 6.81(2H, m), 6.95(1H, m), 7.17~7.3(7H, m), 7.37~7.4(2H, m), 7.54(2H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.37(1H, m)	526.67	526.24
263	δ = 1.72(6H, s), 6.63(4H, m), 6.81(2H, m), 6.95~6.98(2H, m), 7.17~7.3(7H, m), 7.37~7.4(3H, m), 7.6(1H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.03~8.04(2H, m), 8.37~8.4(2H, m)	576.73	576.26
266	δ = 1.72(12H, s), 6.58~6.63(5H, m), 6.75~6.81(3H, m), 6.95(1H, m), 7.17~7.3(7H, m), 7.37~7.4(2H, m), 7.62~7.63(2H, m), 7.69(1H, m), 7.77(2H, m), 7.87~7.93(2H, m), 8.37(1H, m)	642.83	642.30
271	δ = 1.72(12H, s), 6.58(1H, m), 6.75(1H, m), 6.95(1H, m), 7.17(1H, m), 7.26~7.3(2H, m), 7.36~7.4(4H, m), 7.49~7.5(4H, m), 7.62~7.63(2H, m), 7.69~7.77(7H, m), 7.84~7.93(6H, m), 8.37(1H, m)	742.95	742.33

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278	δ = 1.72(6H, s), 6.63(2H, m), 6.81(1H, m), 6.95~6.98(2H, m), 7.17~7.3(5H, m), 7.37~7.46(8H, m), 7.64~7.77(5H, m), 7.84~7.87(2H, m), 8.02~8.07(2H, m), 8.37(1H, m)	626.79	626.27
301	δ = 1.72(6H, s), 6.63(2H, m), 6.69~6.81(5H, m), 6.95(1H, m), 7.17~7.3(5H, m), 7.37~7.4(3H, m), 7.54~7.59(5H, m), 7.73(1H, m), 7.92(1H, m), 8(2H, m), 8.37(1H, m)	576.73	576.26
320	δ = 1.72(6H, s), 7.26~7.3(2H, m), 7.37~7.41(4H, m), 7.51~7.52(8H, m), 7.59(1H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.54(1H, m)	435.56	435.20
341	δ = 1.72(6H, s), 7.25~7.4(10H, m), 7.5(2H, m), 7.59~7.69(8H, m), 7.77~7.79(5H, m), 7.87(1H, m), 7.94(2H, m), 8.12(2H, m), 8.54~8.55(3H, m)	765.94	765.31
360	δ = 1.72(30H, s), 6.15(1H, m), 6.58(4H, m), 6.75~6.77(6H, m), 7.26~7.3(6H, m), 7.37~7.45(8H, m), 7.55(4H, m), 7.62(4H, m), 7.87(4H, m)	1082.42	1081.53
374	δ = 1.72(18H, s), 6.15(1H, m), 6.58(2H, m), 6.75~6.77(4H, m), 6.98(2H, m), 7.26~7.3(4H, m), 7.37~7.45(8H, m), 7.53~7.62(10H, m), 7.87(2H, m), 8.02~8.07(4H, m)	950.22	949.44
394	δ = 1.72(6H, s), 6.63(8H, m), 6.69(4H, m), 6.81(4H, m), 7.2~7.3(10H, m), 7.37~7.4(2H, m), 7.54~7.59(5H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.54(1H, m)	769.97	769.35
402	δ = 1.72(6H, s), 6.63(4H, m), 6.69(4H, m), 6.81(2H, m), 6.98(2H, m), 7.2~7.3(6H, m), 7.37~7.4(4H, m), 7.53~7.59(11H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.02~8.07(4H, m), 8.54(1H, m)	870.09	869.38
415	δ = 1.72(12H, s), 7.26~7.3(3H, m), 7.37~7.41(4H, m), 7.51~7.63(7H, m), 7.69(1H, m), 7.77(2H, m), 7.87~7.93(3H, m), 8.54(1H, m)	551.72	551.26
428	δ = 1.72(6H, s), 6.63(4H, m), 6.75~6.81(4H, m), 7.2~7.3(6H, m), 7.37~7.41(4H, m), 7.51~7.52(4H, m), 7.59(1H, m), 8.54(1H, m)	526.67	526.24
432	δ = 1.72(6H, s), 6.63(4H, m), 6.75~6.81(4H, m), 7.2~7.3(6H, m), 7.37~7.4(3H, m), 7.58~7.59(4H, m), 7.73(1H, m), 7.92(1H, m), 8(2H, m), 8.54(1H, m)	576.73	576.26
447	δ = 1.72(6H, s), 6.63(4H, m), 6.69(2H, m), 6.81(2H, m), 7.2~7.3(6H, m), 7.37~7.41(3H, m), 7.51~7.59(7H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.54(1H, m)	602.76	602.27
454	δ = 1.72(6H, s), 6.15(1H, m), 6.63(6H, m), 6.69(2H, m), 6.81(3H, m), 6.98(1H, m), 7.2~7.3(8H, m), 7.37~7.45(4H, m), 7.53~7.57(5H, m), 7.69(1H, m), 7.77(1H, m), 7.87(1H, m), 8.02~8.07(2H, m)	743.93	743.33
462	δ = 1.72(6H, s), 7.41(3H, m), 7.51~7.52(12H, m), 7.59~7.61(3H, m), 7.69(1H, m), 7.77(1H, m), 7.86~7.87(2H, m), 8.54(1H, m)	511.65	511.23

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473	δ = 1.72(6H, s), 7.25~7.33(10H, m), 7.44~7.54(5H, m), 7.63(5H, m), 7.8(1H, m), 7.94~8.01(5H, m), 8.12(3H, m), 8.55(3H, m)	778.94	778.31
480	δ = 1.72(6H, s), 2.34(36H, s), 6.15(1H, m), 6.36(12H, m), 6.45(1H, m), 6.62(1H, m), 6.71~6.77(8H, m), 7.29(1H, m), 7.38(1H, m), 7.45(1H, m)	953.31	952.54
494	δ = 1.72(6H, s), 6.63(12H, m), 6.69(6H, m), 6.81(6H, m), 7.2(12H, m), 7.54~7.61(9H, m), 7.69(1H, m), 7.77(1H, m), 7.86~7.87(2H, m), 8.54(1H, m)	1013.27	1012.45
496	δ = 1.72(6H, s), 6.69(6H, m), 6.98(3H, m), 7.36~7.38(6H, m), 7.49~7.54(24H, m), 7.69~7.77(8H, m), 7.84~7.88(8H, m), 8.02~8.07(6H, m), 8.54(1H, m)	1313.63	1312.54
516	δ = 1.72(12H, s), 6.95(1H, m), 7.12~7.17(3H, m), 7.25~7.33(3H, m), 7.5~7.51(2H, m), 7.59~7.68(4H, m), 7.79~7.81(3H, m), 7.94(1H, m), 8.12(1H, m), 8.37(1H, m), 8.55(1H, m)	564.72	564.26
538	δ = 1.72(12H, s), 6.15(1H, m), 6.57~6.63(3H, m), 6.69(2H, m), 6.81(1H, m), 6.95(1H, m), 7.12~7.2(5H, m), 7.41(1H, m), 7.51~7.54(7H, m), 8.37(1H, m)	566.73	566.27
571	δ = 1.72(12H, s), 6.63(4H, m), 6.69(2H, m), 6.81(2H, m), 6.95(1H, m), 7.12~7.2(7H, m), 7.51~7.59(4H, m), 7.81(1H, m), 8.37(1H, m)	566.73	566.27
586	δ = 1.72(12H, s), 6.63(2H, m), 6.69(2H, m), 6.81(1H, m), 6.95~6.98(2H, m), 7.12~7.2(5H, m), 7.38(1H, m), 7.51~7.59(7H, m), 7.81(1H, m), 8.02~8.07(2H, m), 8.37(1H, m)	616.79	616.29
600	δ = 1.35(9H, s), 1.72(12H, s), 6.55(2H, m), 6.95~7.01(4H, m), 7.12~7.17(3H, m), 7.38(1H, m), 7.46(1H, m), 7.49(1H, m), 7.51~7.57(8H, m), 7.81~7.84(2H, m), 8.02~8.07(2H, m), 8.37(1H, m)	722.96	722.37
602	δ = 1.72(12H, s), 6.15(1H, m), 6.57~6.63(3H, m), 6.69(2H, m), 6.81(1H, m), 6.95(1H, m), 7.12~7.2(5H, m), 7.51~7.59(6H, m), 7.73(1H, m), 7.92(1H, m), 8(2H, m), 8.37(1H, m)	616.79	616.29
624	δ = 1.72(12H, s), 6.15(1H, m), 6.57(1H, m), 6.69(4H, m), 6.95(1H, m), 7.12~7.17(3H, m), 7.51~7.59(11H, m), 7.73(2H, m), 7.92(2H, m), 8(4H, m), 8.37(1H, m)	742.95	742.33
648	δ = 1.72(12H, s), 7.12(2H, m), 7.39~7.41(10H, m), 7.51~7.52(9H, m), 7.59(2H, m), 7.81(1H, m), 7.91(8H, m), 8.54(1H, m)	828.05	827.36
685	δ = 1.72(12H, s), 6.63(8H, m), 6.69(4H, m), 6.81(4H, m), 7.12(2H, m), 7.2(8H, m), 7.51~7.59(7H, m), 7.81(1H, m), 8.54(1H, m)	810.04	809.38

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689	δ = 1.72(12H, s), 6.63(8H, m), 6.69(2H, m), 6.81(4H, m), 7.04(1H, m), 7.12(2H, m), 7.2(8H, m), 7.51~7.59(7H, m), 7.78~7.81(2H, m), 8.07(1H, m), 8.49~8.54(2H, m)	860.09	859.39
698	δ = 1.72(12H, s), 2.34(12H, s), 6.51(8H, m), 6.69(4H, m), 6.98(8H, m), 7.12(2H, m), 7.51~7.59(7H, m), 7.81(1H, m), 8.54(1H, m)	866.14	865.44
712	δ = 1.72(12H, s), 6.63(4H, m), 6.69(8H, m), 6.81(2H, m), 7.12(2H, m), 7.2(4H, m), 7.51~7.61(17H, m), 7.81(1H, m), 8.04~8.08(4H, m), 8.42(2H, m), 8.54~8.55(3H, m)	1062.34	1061.47
724	δ = 1.72(12H, s), 6.15(1H, m), 6.57~6.63(5H, m), 6.81(2H, m), 7.12(2H, m), 7.2(4H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.59(1H, m), 8.54(1H, m)	566.73	566.27
736	δ = 1.72(12H, s), 6.15(1H, m), 6.57~6.63(3H, m), 6.81(1H, m), 7.12(2H, m), 7.2(2H, m), 7.36(1H, m), 7.49~7.51(3H, m), 7.58~7.59(4H, m), 7.73~7.77(3H, m), 7.84~7.92(3H, m), 8(2H, m), 8.54(1H, m)	666.85	666.30
758	δ = 1.72(12H, s), 6.63(4H, m), 6.69(2H, m), 6.81(2H, m), 7.12(2H, m), 7.2(4H, m), 7.51~7.59(8H, m), 7.73(1H, m), 7.81(1H, m), 7.92(1H, m), 8(2H, m), 8.54(1H, m)	692.89	692.32
779	δ = 1.72(12H, s), 7.41(3H, m), 7.51~7.52(12H, m), 7.59(2H, m), 7.68(2H, m), 7.81(1H, m), 8.54(1H, m)	551.72	551.26
802	δ = 1.72(12H, s), 6.63(12H, m), 6.69(6H, m), 6.81(6H, m), 7.2(12H, m), 7.54~7.59(8H, m), 7.68(2H, m), 7.81(1H, m), 8.54(1H, m)	1053.34	1052.48
805	δ = 1.72(12H, s), 6.63(6H, m), 6.69(6H, m), 6.81(3H, m), 7.2(6H, m), 7.36(3H, m), 7.49~7.59(14H, m), 7.68(2H, m), 7.74~7.88(13H, m), 8.54(1H, m)	1203.51	1202.53
830	δ = 1.72(12H, s), 6.55(1H, m), 6.61(1H, m), 6.73(1H, m), 6.87(3H, m), 7.02~7.05(2H, m), 7.36~7.41(3H, m), 7.51~7.52(8H, m), 7.61~7.66(4H, m)	553.73	553.28
872	δ = 1.72(12H, s), 6.55(1H, m), 6.61(1H, m), 6.73(1H, m), 6.87(3H, m), 7.02~7.05(2H, m), 7.25(4H, m), 7.36(1H, m), 7.55(2H, m), 7.61(2H, m), 8.04~8.08(2H, m), 8.42(1H, m), 8.55(1H, m)	527.70	527.26
925	δ = 1.72(12H, s), 6.2(1H, m), 6.3(1H, m), 6.37(1H, m), 6.55(1H, m), 6.73(1H, m), 6.87~6.91(4H, m), 6.98~7.05(3H, m), 7.38(1H, m), 7.53~7.57(3H, m), 7.82~7.88(4H, m), 8.02~8.12(4H, m), 8.93(2H, m)	642.83	642.30
978	δ = 1.72(12H, s), 6.55(1H, m), 6.61~6.63(5H, m), 6.73(1H, m), 6.81(2H, m), 6.87(3H, m), 6.98~7.05(3H, m), 7.2(4H, m), 7.36~7.38(2H, m), 7.6~7.61(2H, m), 8.03~8.04(2H, m), 8.4(1H, m)	618.81	618.30

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984	δ = 1.72(12H, s), 6.55(1H, m), 6.61~6.63(5H, m), 6.69~6.73(3H, m), 6.81(2H, m), 6.87(3H, m), 7.02~7.05(2H, m), 7.2(4H, m), 7.36(1H, m), 7.54(2H, m), 7.61(1H, m)	568.75	568.29
1002	δ = 1.72(18H, s), 6.55~6.63(5H, m), 6.73~6.81(3H, m), 6.87(3H, m), 7.02~7.05(2H, m), 7.2(2H, m), 7.36(2H, m), 7.49~7.5(2H, m), 7.61~7.63(3H, m), 7.74~7.77(3H, m), 7.84~7.93(3H, m)	734.97	734.37
1004	δ = 1.72(12H, s), 6.55(1H, m), 6.61~6.63(3H, m), 6.69~6.73(3H, m), 6.81(1H, m), 6.87(3H, m), 6.98~7.05(3H, m), 7.2(2H, m), 7.36~7.38(2H, m), 7.53~7.61(6H, m), 8.02~8.07(2H, m)	618.81	618.30
1026	δ = 1.72(12H, s), 6.2(1H, m), 6.3(1H, m), 6.37(1H, m), 6.55(1H, m), 6.69~6.73(3H, m), 6.87(3H, m), 6.98~7.05(3H, m), 7.38(1H, m), 7.53~7.59(8H, m), 7.73(1H, m), 7.92(1H, m), 8~8.07(4H, m)	668.87	668.32
1042	δ = 1.72(12H, s), 6.55(1H, m), 6.61(1H, m), 6.73(1H, m), 7.02~7.05(2H, m), 7.36~7.43(5H, m), 7.51~7.52(8H, m), 7.61(1H, m)	477.64	477.25
1048	δ = 1.35(18H, s), 1.72(12H, s), 6.55(1H, m), 6.61(1H, m), 6.73(1H, m), 7.02~7.05(2H, m), 7.36~7.43(11H, m), 7.61(1H, m)	589.85	589.37
1073	δ = 1.72(12H, s), 6.55(1H, m), 6.61(1H, m), 6.73(1H, m), 7.02~7.05(2H, m), 7.36~7.43(13H, m), 7.51~7.52(8H, m), 7.61(1H, m), 7.91(8H, m)	830.06	829.37
1117	δ = 1.72(12H, s), 6.55(1H, m), 6.61~6.63(9H, m), 6.69~6.73(5H, m), 6.81(4H, m), 7.02~7.05(2H, m), 7.2(8H, m), 7.36(1H, m), 7.43(2H, m), 7.54(4H, m), 7.61(1H, m)	812.05	811.39
1123	δ = 1.72(24H, s), 6.55~6.63(12H, m), 6.73~6.81(7H, m), 7.02~7.05(2H, m), 7.2(8H, m), 7.36(1H, m), 7.43(2H, m), 7.61~7.63(5H, m), 7.77(2H, m), 7.93(2H, m)	1044.37	1043.52
1138	δ = 1.72(18H, s), 6.55(1H, m), 6.61(1H, m), 6.73(1H, m), 7.02~7.05(2H, m), 7.28(1H, m), 7.36~7.43(5H, m), 7.51~7.55(5H, m), 7.61~7.63(2H, m), 7.77(1H, m), 7.87~7.93(2H, m)	593.80	593.31
1155	δ = 1.72(12H, s), 6.2(1H, m), 6.3(1H, m), 6.37(1H, m), 6.55(1H, m), 6.63(4H, m), 6.73(1H, m), 6.81(2H, m), 7.02~7.05(2H, m), 7.2(4H, m), 7.43(2H, m), 7.58~7.59(3H, m), 7.73(1H, m), 7.92(1H, m), 8(2H, m)	618.81	618.30
1166	δ = 1.72(12H, s), 6.2(1H, m), 6.3(1H, m), 6.37(1H, m), 6.55(1H, m), 6.63(2H, m), 6.69~6.73(3H, m), 6.81(1H, m), 7.02~7.05(2H, m), 7.2(2H, m), 7.41~7.43(3H, m), 7.51~7.55(8H, m), 7.61(1H, m), 8.04~8.08(2H, m), 8.42(1H, m), 8.55(1H, m)	694.90	694.33

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1173	δ = 1.72(12H, s), 6.19(2H, m), 6.55(1H, m), 6.61~6.63(9H, m), 6.69~6.73(3H, m), 6.81(4H, m), 7.02~7.05(2H, m), 7.2(8H, m), 7.36(1H, m), 7.54(2H, m), 7.61(1H, m)	735.96	735.36
1177	δ = 1.72(12H, s), 6.19(2H, m), 6.55(1H, m), 6.61~6.63(7H, m), 6.69~6.73(3H, m), 6.81(3H, m), 6.98~7.05(3H, m), 7.2(6H, m), 7.36~7.38(2H, m), 7.53~7.61(6H, m), 8.02~8.07(2H, m)	786.01	785.38
1183	δ = 1.72(12H, s), 6.19(2H, m), 6.55(1H, m), 6.61~6.63(7H, m), 6.69~6.73(3H, m), 6.81(3H, m), 7.02~7.05(2H, m), 7.2(6H, m), 7.36(2H, m), 7.49~7.54(4H, m), 7.61(1H, m), 7.74~7.77(2H, m), 7.84~7.88(2H, m)	786.01	785.38
1196	δ = 1.72(12H, s), 6.55(2H, m), 7.19~7.38(15H, m), 7.5(3H, m), 7.63(3H, m), 7.94(3H, m), 8.12(3H, m), 8.55(3H, m)	821.02	820.36
1201	δ = 1.35(54H, s), 1.72(12H, s), 6.19~6.2(4H, m), 6.3(2H, m), 6.37(2H, m), 6.55(12H, m), 7.01(12H, m)	1163.70	1162.78
1208	δ = 1.72(30H, s), 6.19~6.2(4H, m), 6.3(2H, m), 6.37(2H, m), 6.58~6.63(9H, m), 6.75~6.81(6H, m), 7.2(6H, m), 7.28(3H, m), 7.38(3H, m), 7.55(3H, m), 7.62(3H, m), 7.87(3H, m)	1175.55	1174.59
1217	δ = 1.72(12H, s), 6.61~6.63(14H, m), 6.69(6H, m), 6.81(6H, m), 7.2(12H, m), 7.36(2H, m), 7.43(2H, m), 7.54(6H, m), 7.61(2H, m)	1055.35	1054.50
1219	δ = 1.72(12H, s), 6.61(2H, m), 6.69(6H, m), 6.98(3H, m), 7.36~7.43(10H, m), 7.49~7.61(23H, m), 7.74~7.77(6H, m), 7.84~7.88(6H, m), 8.02~8.07(6H, m)	1355.71	1354.59
1243	δ = 1.72(24H, s), 6.87(6H, m), 7.25~7.28(5H, m), 7.38~7.43(3H, m), 7.55(1H, m), 7.63(1H, m), 7.77(1H, m), 7.87~7.93(2H, m)	633.86	633.34
1249	δ = 1.72(18H, s), 6.87(6H, m), 7.25(4H, m), 7.39~7.43(7H, m), 7.51~7.52(4H, m), 7.91(4H, m)	693.92	693.34
1264	δ = 1.72(24H, s), 6.19(2H, m), 6.58~6.63(3H, m), 6.75~6.81(2H, m), 6.87(6H, m), 7.2(2H, m), 7.28(1H, m), 7.38(1H, m), 7.55(1H, m), 7.62(1H, m), 7.87(1H, m)	648.88	648.35
1295	δ = 1.72(18H, s), 6.63(4H, m), 6.81(2H, m), 6.87(6H, m), 7.04(1H, m), 7.2(4H, m), 7.43(2H, m), 7.53~7.54(2H, m), 7.78(1H, m), 8.07(1H, m), 8.49(1H, m)	658.87	658.33
1316	δ = 1.72(18H, s), 6.63(2H, m), 6.69(2H, m), 6.81(1H, m), 6.87(6H, m), 7.2(2H, m), 7.36(1H, m), 7.43(2H, m), 7.49~7.54(4H, m), 7.74~7.77(2H, m), 7.84~7.88(2H, m)	658.87	658.33
1364	δ = 1.72(18H, s), 6.87(3H, m), 7.25~7.33(6H, m), 7.43(4H, m), 7.5(2H, m), 7.63~7.68(6H, m), 7.79(4H, m), 7.94(2H, m), 8.12(2H, m), 8.55(2H, m)	848.08	847.39

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1404	δ = 1.72(18H, s), 6.63(8H, m), 6.69(4H, m), 6.81(4H, m), 6.87(3H, m), 7.2(8H, m), 7.43(4H, m), 7.54(4H, m)	852.12	851.42
1409	δ = 1.72(18H, s), 6.69(4H, m), 6.87(3H, m), 7.36(4H, m), 7.43(4H, m), 7.49~7.54(12H, m), 7.74~7.77(8H, m), 7.84~7.88(8H, m)	1052.35	1051.49
1417	δ = 1.72(18H, s), 2.34(12H, s), 6.51(8H, m), 6.69(4H, m), 6.87(3H, m), 6.98(8H, m), 7.43(4H, m), 7.54(4H, m)	908.22	907.49
1428	δ = 1.72(18H, s), 6.63(4H, m), 6.69(2H, m), 6.81(2H, m), 6.87(3H, m), 6.98~7.04(3H, m), 7.2(4H, m), 7.38~7.43(6H, m), 7.53~7.57(10H, m), 7.78(1H, m), 8.02~8.07(5H, m), 8.49(1H, m)	1002.29	1001.47
1454	δ = 1.72(18H, s), 6.19(2H, m), 6.63(2H, m), 6.81(1H, m), 6.87(3H, m), 6.98(1H, m), 7.2(2H, m), 7.38~7.43(3H, m), 7.53~7.59(6H, m), 7.73(1H, m), 7.92(1H, m), 8~8.07(4H, m)	708.93	708.35
1469	δ = 1.72(18H, s), 6.63(4H, m), 6.69(2H, m), 6.81(2H, m), 6.87(3H, m), 7.2(4H, m), 7.41~7.43(5H, m), 7.51~7.54(6H, m)	684.91	684.35
1473	δ = 1.72(18H, s), 6.63(2H, m), 6.69(2H, m), 6.81(1H, m), 6.87(3H, m), 6.98(1H, m), 7.2(2H, m), 7.38~7.43(6H, m), 7.51~7.57(9H, m), 8.02~8.07(2H, m)	734.97	734.37
1484	δ = 1.72(18H, s), 6.19(2H, m), 6.63(6H, m), 6.69(2H, m), 6.81(3H, m), 6.87(3H, m), 6.98(1H, m), 7.2(6H, m), 7.38~7.43(3H, m), 7.53~7.57(5H, m), 8.02~8.07(2H, m)	826.08	825.41
1505	δ = 1.72(18H, s), 7.2~7.33(15H, m), 7.5(3H, m), 7.63(3H, m), 7.94(3H, m), 8.12(3H, m), 8.55(3H, m)	861.08	860.39
1507	δ = 1.72(18H, s), 7.25~7.33(9H, m), 7.43(6H, m), 7.5(3H, m), 7.63~7.68(9H, m), 7.79(6H, m), 7.94(3H, m), 8.12(3H, m), 8.55(3H, m)	1089.37	1088.48
1513	δ = 1.35(27H, s), 1.72(18H, s), 6.19(6H, m), 6.55(6H, m), 6.63(6H, m), 6.81(3H, m), 7.01(6H, m), 7.2(6H, m)	1035.45	1034.62
1520	δ = 1.72(18H, s), 6.63(12H, m), 6.69(6H, m), 6.81(6H, m), 7.2(12H, m), 7.43(6H, m), 7.54(6H, m)	1095.42	1094.53
1524	δ = 1.72(18H, s), 6.63(6H, m), 6.69(6H, m), 6.81(3H, m), 6.98(3H, m), 7.2(6H, m), 7.38~7.43(9H, m), 7.53~7.57(15H, m), 8.02~8.07(6H, m)	1245.59	1244.58
1528	δ = 1.72(18H, s), 6.63(6H, m), 6.81(3H, m), 7.04(3H, m), 7.2(6H, m), 7.36(3H, m), 7.43(6H, m), 7.49~7.54(12H, m), 7.74~7.88(15H, m), 8.07(3H, m), 8.49(3H, m)	1395.77	1394.62

<363>

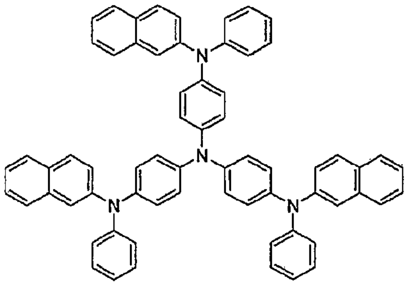
<364> [Example 1] Manufacture of an OLED by using compounds for organic electronic material according to the invention (I)

<365> An OLED device was manufactured by using a compound for electronic material according to the invention.

<366> First, a transparent electrode ITO thin film (15 /?) (2) prepared from glass for OLED (produced by Samsung Corning) (1) was subjected to ultrasonic washing with trichloroethylene, acetone, ethanol and distilled water, sequentially, and stored in isopropanol before use.

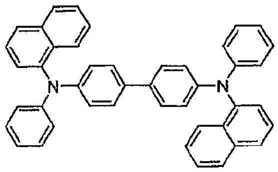
<367> Then, an ITO substrate was equipped in a substrate folder of a vacuum

vapor-deposit device, and 4,4',4-tris(N,N-(2-naphthyl)-phenylamino)triphenylamine (2-TNATA) (of which the structure is shown below) was placed in a cell of the vacuum vapor-deposit device, which was then ventilated up to 10^{-6} torr of vacuum in the chamber. Electric current was applied to the cell to evaporate 2-TNATA, thereby providing vapor-deposit of a hole injecting layer (3) having 60 nm thickness on the ITO substrate.



<368> 2-TNATA

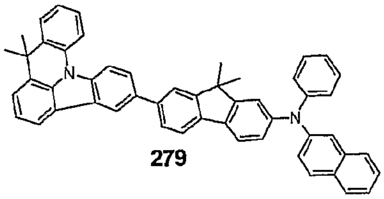
<369> Then, to another cell of the vacuum vapor-deposit device, charged was N,N'-bis(-naphthyl)-N,N'-diphenyl-4,4'-diamine (NPB) (of which the structure is shown below), and electric current was applied to the cell to evaporate NPB, thereby providing vapor-deposit of a hole transport layer (4) of 20 nm thickness on the hole injecting layer.



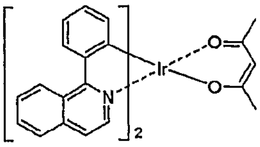
<370> NPB

<371> After forming a hole injecting layer and a hole transport layer, an electroluminescent layer was vapor-deposited as follows. To one cell of said vacuum vapor-deposit device, charged was a compound according to the invention (e.g., Compound 279) as host material (which had been purified via sublimation in vacuo at 10^{-6} torr), and an electroluminescent dopant compound (e.g., $(piq)_2Ir(acac)$) was charged to another cell. The two substances were evaporated at different rates to carry out doping at a concentration of 4 to 10% by weight, thereby vapor-depositing an electroluminescent layer (5) with

30 nm of thickness on the hole transport layer.



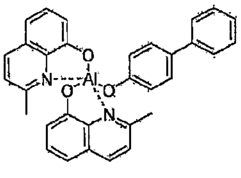
279



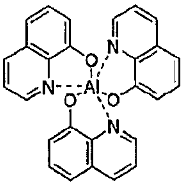
$(piq)_2Ir(acac)$

<372>

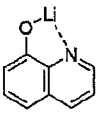
<373> Then, on the electroluminescent layer, bis(2-methyl-8-quinolinato)(p-phenylphenolato)aluminum (III) (BAlq) was vapor-deposited as a hole blocking layer with a thickness of 5 nm, tris(8-hydroxyquinoline)aluminum (III) (Alq) was vapor-deposited as an electron transport layer (6) with a thickness of 20 nm, and then lithium quinolate (Liq) was vapor-deposited as an electron injecting layer (7) with a thickness of 1 to 2 nm. Thereafter, an Al cathode (8) was vapor-deposited with a thickness of 150 nm by using another vacuum vapor-deposit device to manufacture an OLED.



BAlq



Alq

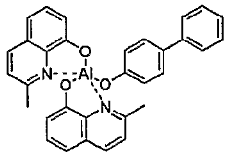


Liq

<374>

<375> [Comparative Example 1] Electroluminescent properties of OLED employing conventional electroluminescent material

<376> An OLED device was manufactured according to the same procedure as in Example 1, but using bis(2-methyl-8-quinolinato)(p-phenylphenolato)aluminum (III) (BAlq) as electroluminescent host material in another cell of the vacuum deposit device, instead of the electroluminescent compound according to the present invention.



BAlq

<377>

<378> The luminous efficiencies and power efficiencies of the OLED's comprising the organic electroluminescent compound according to the present

invention (Example 1) or conventional electroluminescent compound (Comparative Example 1) were measured at 1,000 cd/m^2, respectively, and the results are shown in Table 2.

<379> [Table 2]

No.	Host material	EL material	Hole blocking layer	Operation voltage (V) @1,000 cd/m^2	Power efficiency (lm/W) @1,000 cd/m^2	EL color
1	279	$(piq)_2Ir(acac)$	BAlq	6.5	4.4	Red
2	298	$(piq)_2Ir(acac)$	BAlq	6.7	4.7	Red
3	592	$(piq)_2Ir(acac)$	BAlq	6.5	4.8	Red
4	600	$(piq)_2Ir(acac)$	BAlq	6.8	4.4	Red
5	990	$(piq)_2Ir(acac)$	BAlq	6.8	4.0	Red
6	1005	$(piq)_2Ir(acac)$	BAlq	7.0	4.4	Red
7	1301	$(piq)_2Ir(acac)$	BAlq	6.9	4.3	Red
8	1306	$(piq)_2Ir(acac)$	BAlq	6.5	4.3	Red
9	1315	$(piq)_2Ir(acac)$	BAlq	6.8	4.7	Red
10	1473	$(piq)_2Ir(acac)$	BAlq	6.9	4.2	Red
Comp.1	BAlq	$(piq)_2Ir(acac)$	-	7.5	2.6	Red

<380>

<381> As can be seen from Table 2, the complexes developed according to the present invention showed better electroluminescent properties than conventional material.

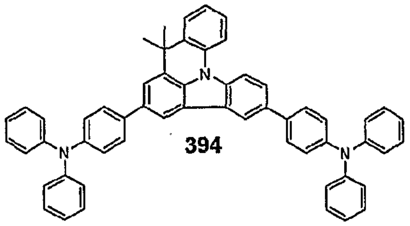
<382> Thus, the devices employing the electroluminescent compounds as host material exhibit excellent electroluminescent properties with lowered operation voltage to induce increase of power efficiency by 0.8~2.2 lm/W with improved power consumption.

<383> [Example 2] Electroluminescent properties of OLED using compounds for organic electronic material according to the invention (II)

<384> After forming a hole injecting layer (3) according to the same procedure as in Example 1, Compound (394) (of which the structure is shown below) was charged to another cell of the vacuum vapor-deposit device, and

electric current was applied to the cell to evaporate the material to vapor-deposit a hole transport layer (4) with a thickness of 20 nm on the hole injecting layer.

<385>



394

<386> An OLED was manufactured according to the same procedure as in Example 1, otherwise.

<387> The luminous efficiencies of the OLED's comprising the compound for electronic material according to the present invention (Example 2) or conventional electroluminescent compound (Comparative Example 1) were measured at 5,000 cd/m^2, respectively, and the results are shown in Table 3.

<388> [Table 3]

No.	Material of hole transport layer	Operation voltage (V) @1,000 cd/m^2	Luminous efficiency (cd/A) @1,000 cd/m^2	Color
1	Compound 394	5.5	5.4	Red
2	Compound 765	5.4	5.6	Red
Comp.1	NPB	6	4.5	Red

<389>

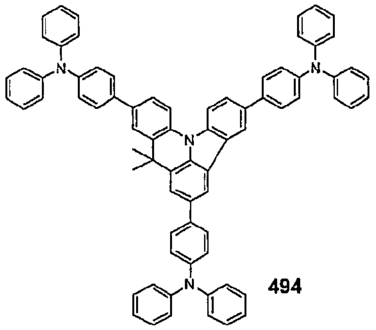
<390> It is confirmed that the compounds developed by the present invention exhibit better properties than conventional materials in view of performances.

<391>

<392> [Example 3] Electroluminescent properties of OLED employing compounds for organic electronic material according to the invention (III)

<393> An ITO substrate was equipped in a substrate folder of a vacuum vapor-deposit device according to the same procedure as in Example 1. Compound (494) (of which the structure is shown below) was placed in a cell of the vacuum vapor-deposit device, which was then ventilated up to 10^{-6} torr of

vacuum in the chamber. Electric current was applied to the cell to evaporate Compound (494), thereby providing vapor-deposit of a hole injecting layer (3) having 60 nm of thickness on the ITO substrate.


494

<394>

<395> An OLED was manufactured according to the same procedure as in Example 1, otherwise.

<396> The luminous efficiencies of the OLED's comprising organic electroluminescent compounds according to the present invention (Example 3) or conventional electroluminescent compound (Comparative Example 1) were measured at 5,000 cd/m^2, respectively, and the results are shown in Table 4.

<397> [Table 4]

No.	Material of hole injecting layer	Operation voltage (V) @1,000 cd/m^2	Luminous efficiency (cd/A) @1,000 cd/m^2	Color
1	Compound 494	5.2	5.4	Red
2	Compound 805	5.0	5.6	Red
Comp.1	2-TNATA	6	4.5	Red

<398>

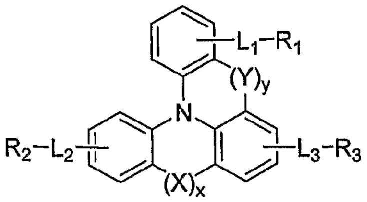
<399> It is confirmed that the compounds developed by the present invention exhibit better properties than conventional materials in view of performances.

【CLAIMS】

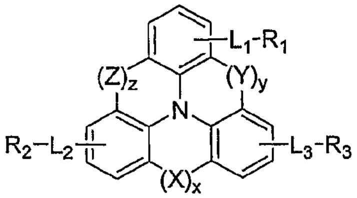
【Claim 1】

<400> A compound for organic electronic material represented by Chemical Formula (1) or (2):

<401> [Chemical Formula 1]

<402> 

<403> [Chemical Formula 2]

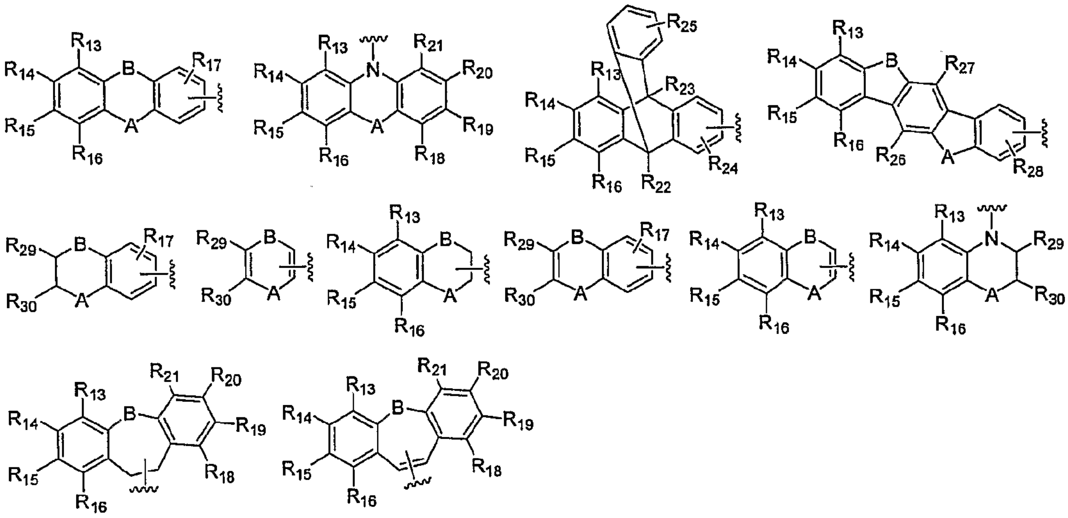
<404> 

<405> wherein,

<406> L_1, L_2 and L_3 independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkylene, adamantylene, (C7-C60)bicycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C6-C60)ar(C1-C60)alkylene, (C1-C60)alkyenethio, (C1-C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

<407> R_1, R_2 and R_3 independently represent hydrogen, deuterium, (C6-C60)aryl, (C3-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, $NR_{11}R_{12}$, or a substituent selected from the following structures (excluding the case wherein R_1, R_2 and R_3 are hydrogen all at the same time):

<408>



<409> R_{11} and R_{12} independently represent (C6-C60)aryl or (C3-C60)heteroaryl, or may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<410> R_{13} through R_{30} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or each of R_{13} through R_{25} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<411> A, B, X, Y and Z independently represent a chemical bond, or $(CR_{31}R_{32})_a$-, -$N(R_{33})$-, -S-, -O-, -$Si(R_{34})(R_{35})$-, -$P(R_{36})$-, -C(=O)-, -$B(R_{37})$-, -$In(R_{38})$-, -Se-, -$Ge(R_{39})(R_{40})$-, -$Sn(R_{41})(R_{42})$-, -$Ga(R_{43})$- or $(R_{44})C=C(R_{45})$-;

<412> R_{31} through R_{45} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R_{31} and R_{32}, R_{34} and R_{35}, R_{39} and R_{40}, R_{41} and R_{42}, or R_{44} and R_{45} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<413> the arylene, heteroarylene, arylenoxy or arylenethio of L_1, L_2 and L_3; the aryl or heteroaryl of R_1, R_2, R_3, R_{11} and R_{12}; or the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, bicycloalkyl, alkenyl, alkynyl, aralkyl, alkyloxy, alkylthio, aryloxy, arylthio, alkylamino, arylamino, alkoxycarbonyl, alkylcarbonyl or arylcarbonyl of R_{13} through R_{30} and R_{31} through R_{45} may be further substituted by one or more substituent(s) selected from a group consisting of deuterium, halogen, (C1-C60)alkyl with or without halogen substituent(s), (C6-C60)aryl, (C3-C60)heteroaryl with or without (C6-C60)aryl substituent(s), morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, carbazolyl, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyl(C6-C60)aryl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl; and

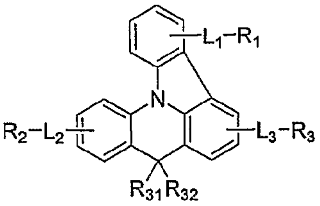
<414> a, x, y and z independently represent an integer from 0 to 4;

<415> but excluding the case wherein R_1-L_1-, R_2-L_2- or R_3-L_3- independently represents diphenylamino group (-NPh_2).

【Claim 2】

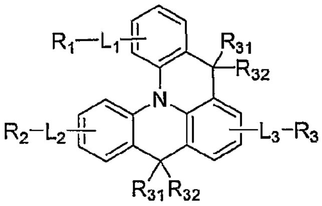
<416> A compound for organic electronic material according to claim 1, which is selected from the compounds represented by Chemical Formulas (3) to (6):

<417> [Chemical Formula 3]



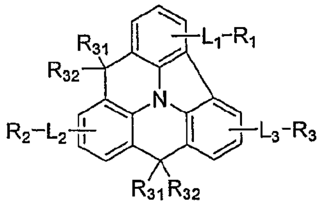
<418>

<419> [Chemical Formula 4]



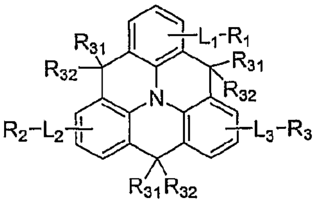
<420>

<421> [Chemical Formula 5]



<422>

<423> [Chemical Formula 6]



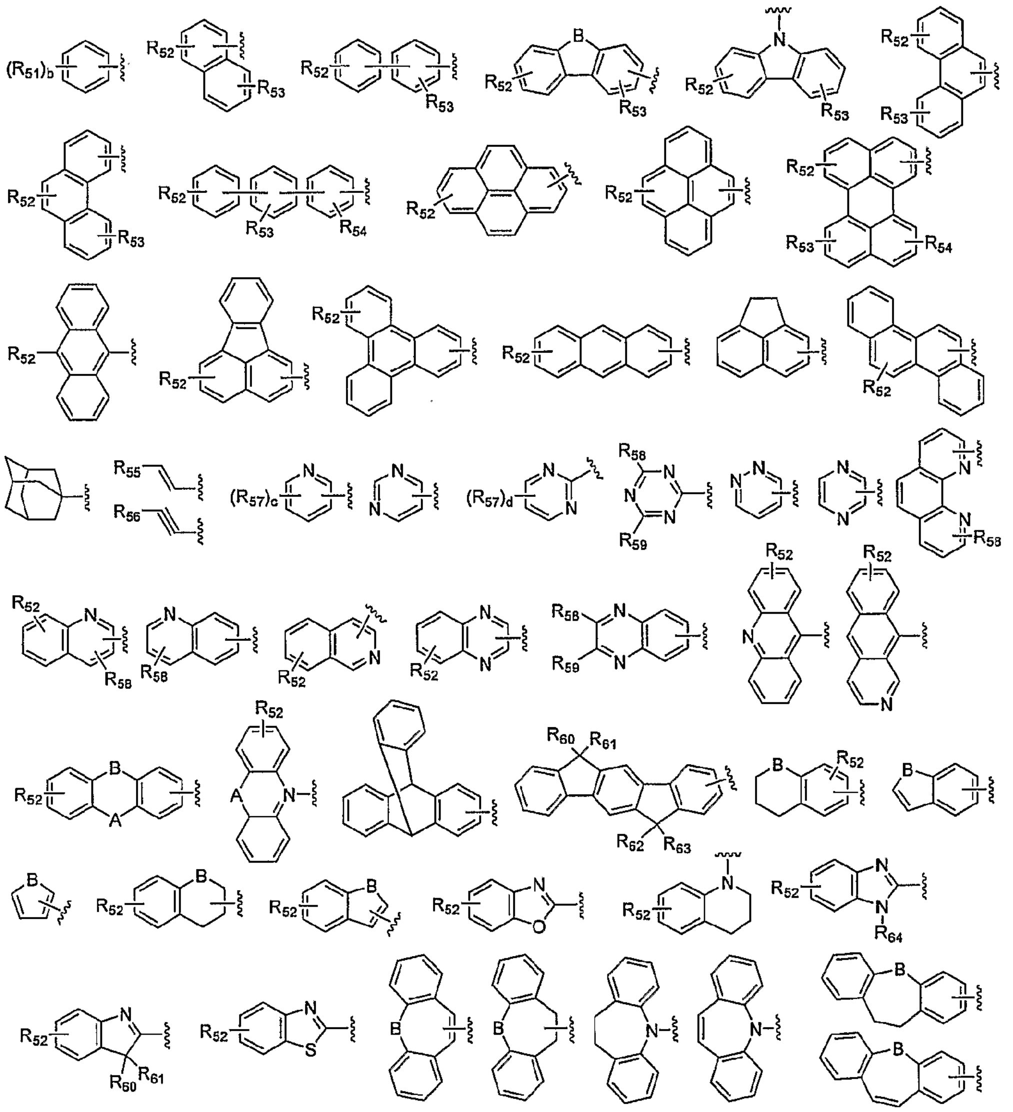
<424>

<425> wherein, L_1, L_2, L_3, R_1, R_2, R_3, R_{31} and R_{32} are defined as in claim 1.

【Claim 3】

<426> A compound for organic electronic material according to claim 2,

wherein R_1, R_2 and R_3 independently represent hydrogen, deuterium or $NR_{11}R_{12}$, or a substituent selected from the following structures:



<427>

<428> wherein, R_{11} and R_{12} are defined as in claim 1;

<429> R_{51} through R_{64} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, halo(C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino,

(C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyl(C6-C60)aryl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl;

<430> A and B independently represent $C(R_{31})(R_{32})$-, $-N(R_{33})-$, -S-, -O-, $-Si(R_{34})(R_{35})-$, $-P(R_{36})-$, -C(=O)-, $-B(R_{37})-$, $-In(R_{38})-$, -Se-, $-Ge(R_{39})(R_{40})-$, $-Sn(R_{41})(R_{42})-$, $-Ga(R_{43})-$ or $(R_{44})C=C(R_{45})-$;

<431> R_{31} through R_{45} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R_{31} and R_{32}, R_{34} and R_{35}, R_{39} and R_{40}, R_{41} and R_{42}, or R_{44} and R_{45} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring;

<432> the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, bicycloalkyl, alkenyl, alkynyl, alkylamino or arylamino of R_{31} through R_{45} and R_{51} through R_{64} may be further substituted by deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, (C1-C60)alkylthio, cyano, (C1-C60)alkylamino, (C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C6-C60)arylcarbonyl, (C1-C60)alkoxycarbonyl, (C1-

C60)alkylcarbonyl, carboxyl, nitro or hydroxyl;

<433> b represents an integer from 1 to 5; c represents an integer from 1 to 4; and d represents an integer from 1 to 3.

【Claim 4】

<434> An organic electronic device which comprises a compound for organic electronic material according to any one of claims 1 to 3.

【Claim 5】

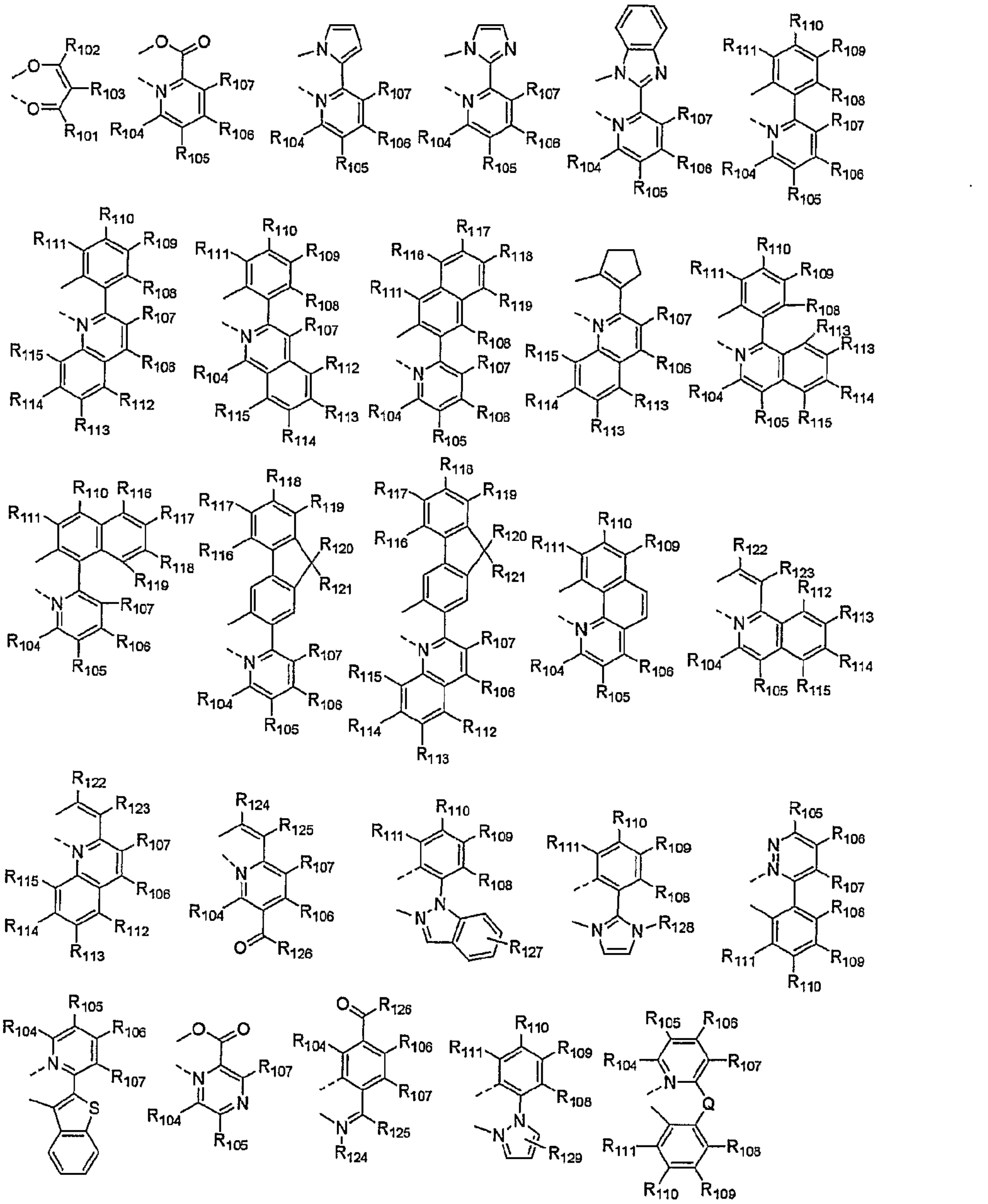
<435> An organic electronic device according to claim 4, which is comprised of a first electrode, a second electrode, and at least one organic layer(s) interposed between the first electrode and the second electrode;

<436> wherein the organic layer comprises one or more compound(s) for organic electronic material according to any one of claims 1 to 3, and one or more dopant(s) represented by Chemical Formula (7):

<437> [Chemical Formula 7]

<438> $M^1L^{101}L^{102}L^{103}$

<439> wherein, M^1 is selected from a group consisting of metals of Group 7, 8, 9, 10, 11, 13, 14, 15 and 16 in the Periodic Table of Elements, and ligands L^{101}, L^{102} and L^{103} are independently selected from the following structures:



<440>

<441> wherein, R_{101} through R_{103} independently represent hydrogen, deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C6-C60)aryl with or without (C1-C60)alkyl substituent(s), or halogen;

<442> R_{104} through R_{119} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C1-C30)alkyloxy, (C3-C60)cycloalkyl, (C2-C30)alkenyl, (C6-C60)aryl, mono or di(C1-C30)alkylamino, mono or di(C6-C30)arylamino, SF_5, tri(C1-C30)alkylsilyl, di(C1-C30)alkyl(C6-C30)arylsilyl, tri(C6-

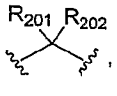
C30)arylsilyl, cyano or halogen; the alkyl, cycloalkyl, alkenyl or aryl of R_{104} through R_{119} may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, (C6-C60)aryl and halogen;

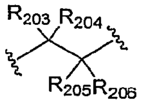
<443> R_{120} through R_{123} independently represent hydrogen, deuterium, (C1-C60)alkyl with or without halogen substituent(s), or (C6-C60)aryl with or without (C1-C60)alkyl substituent(s);

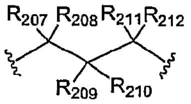
<444> R_{124} and R_{125} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl or halogen, or R_{124} and R_{125} may be linked via (C3-C12)alkylene or (C3-C12)alkenylene with or without a fused ring to form an alicyclic ring, or a monocyclic or polycyclic aromatic ring; the alkyl or aryl of R_{124} and R_{125}, or the alicyclic ring or the monocyclic or polycyclic aromatic ring formed therefrom by linkage via (C3-C12)alkylene or (C3-C12)alkenylene with or without a fused ring may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C30)alkyloxy, halogen, tri(C1-C30)alkylsilyl, tri(C6-C30)arylsilyl and (C6-C60)aryl;

<445> R_{126} represents (C1-C60)alkyl, (C6-C60)aryl, (C5-C60)heteroaryl or halogen;

<446> R_{127} through R_{129} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl or halogen; the alkyl or aryl of R_{126} through R_{129} may be further substituted by halogen or (C1-C60)alkyl; and

<447> Q represents 

, 

or 

, wherein R_{201} through R_{212} independently represent hydrogen, deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C30)alkyloxy, halogen, (C6-C60)aryl, cyano or (C5-C60)cycloalkyl, or each of R_{201} through R_{212} may be linked to an adjacent substituent via alkylene or alkenylene to form a (C5-C7)spiro ring or a (C5-C9)fused ring, or linked to R_{107} or R_{108} via alkylene or alkenylene to form a (C5-C7)fused ring.

【Claim 6】

<448> An organic electronic device according to claim 5, wherein the organic layer comprises one or more compound(s) selected from a group consisting of arylamine compounds and styrylarylamine compounds.

【Claim 7】

<449> An organic electronic device according to claim 5, which comprises one or more metal(s) selected from a group consisting of organometals of Group 1, Group 2, 4th period and 5th period transition metals, lanthanide metals and d-transition elements in the Periodic Table of Elements.

【Claim 8】

<450> An organic electronic device according to claim 5, wherein the organic layer comprises an electroluminescent layer and a charge generating layer.

【Claim 9】

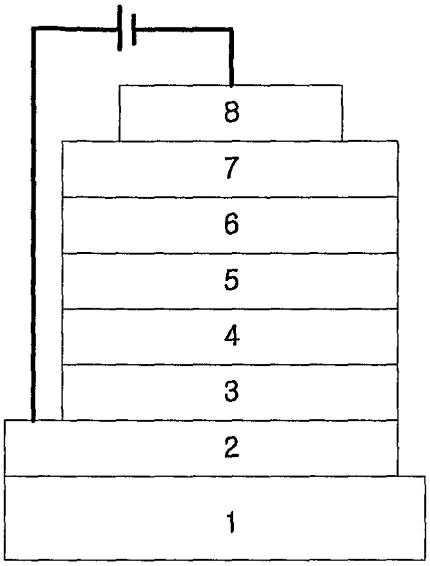
<451> A white electroluminescent device comprising an organic electroluminescent compound according to any one of claims 1 to 3.

【Claim 10】

<452> An organic solar cell comprising an compound for organic electronic material according to any one of claims 1 to 3.

【DRAWINGS】

【Figure 1】



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2009/006350

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

C09K 11/06 (2006.01) *C07D 471/06* (2006.01) *C07D 471/16* (2006.01)
C07D 519/00 (2006.01) *H01L 51/50* (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Registry, CAPlus: Substructure search based upon formulae I and II and keywords based upon electroluminescence, quinoline, pyridine, naphthaline, pyrazole, pyrrole and metal complex

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	WO 2006/033563 A1 (LG CHEM, LTD.) 30 March 2006	
X	The abstract and formulae 1-3, 1-4, 1-9, 1-13, 1-17, 1-20, 1-23, 1-24, 1-25, 1-26, 1-27 and 1-28	1-4
Y		5-9
	WO 2007/031165 A2 (MERCK PATENT GMBH) 22 March 2007	
X	The abstract, page 26 line 29 – page 27 line 6, structures (3)-(6), (8)-(22), (24), (27)-(32), (34)-	1-4
Y	(36), (41)-(46) and (48)	5-9
	WO 2008/066358 A1 (LG CHEM, LTD.) 5 June 2008	
A	The abstract, examples 1-8 and experimental examples	

☒ Further documents are listed in the continuation of Box C ☒ See patent family annex

* Special categories of cited documents:

"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 23 February 2010	Date of mailing of the international search report 24 FEB 2010
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	Authorized officer **GAVIN BARTELL** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6222 3647

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2007/021117 A1 (GRACEL DISPLAY INC.) 22 February 2007 Example 1 and page 35	5-8
Y	Seo, J. H. *et al* "P-160: White organic light-emitting diodes based upon single white dopant of heteroleptic tris-cyclometalated Iridium(III) complex", *Digest of Technical Papers – Society for Information Display*, 2007, Vol. 38, pages 803-805. ISSN: 0003-966X The whole document, in particular figure 1	9
P,X	Chemical Abstracts Accession No. 2009:770032 & KR 20090065201 A (HANA FINE CHEM. CO.) 22 June 2009 The abstract, compounds 40-43, 77-78, 90, 115-116, 128, 143, 151, 167, 204-205, 217, 246-247, 259, 284-285, 297, 322-323 and 340.	1-4
P,X	Zhang, H. *et al* "Synthesis, characterization, and electroluminescent properties of star shaped donor-acceptor dendrimers with carbazole dendrons as peripheral branches and heterotriangulene as central core", Tetrahedron, April 2009, Vol. 65, No. 23, pages 4455-4463. ISSN: 0040-4020 The abstract, section 2.5 and compounds G1 and G2 on page 4456	1, 4

Patent Document Cited in Search Report		Patent Family Member					
WO	2006033563	KR	20060051622				
WO	2007031165	DE	102005043163	EP	1924670	US	2009295275
WO	2008066358	KR	20080049942				
WO	2007021117	CN	101243157	EP	1922382	KR	20070021043
		US	2009128010				
KR	20090065201	NONE					

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX