(54)

1

:

R , 1 15 (, CN CF$_3$
) ,
-O-, -S-, , -CO-, -CO-O-, -O-CO- -O
-CO-O-
Y F, Cl, 1 6 ,
L^1 F .

, .

.

. , DAP( ) , / , TN( )
, STN( ) , SBE( ) OMI( ) .
- (Schadt-Helfrich effect)

.

(fixel)
(MLC)

(,) . , 2
:
1. MOS( ) .
2. (TFT).
, - (modular assembly)

(   )   TN   . 2

CdSe   TFT   TFT

.   TFT

TFT   ,

,   TFT   ,

,

TFT   TN   ,   .

MLC

(varistor)   (MIM =   -   -   )

.

MLC   TV   (,   TV   )   [(laptop)]

-   . MCL

[TOGASHI, S., SEKIGUC
HI, K., TANABE, H., YAMAMOTO, E., SORIMACHI, K., TAJIMA, E., WATANABE, H., SHIMIZU, H., Proc. Eur
odisplay 84, Sept. 1984: A 210-288 Matrix LCD Controlled by Double Stage Diode Rings, p. 141 ff, Paris; S
TROMER, M., Proc. Eurodisplay 84, Sept. 1984: Design of Thin Film Transistors for Matrix Addressing of T
elevision Liquid Crystal Displays, p. 145 ff. Paris].   , MLC

,   (after-image)   .

MLC   ,

(   )   .   ,   ,

.   /   .

.   /   ,

.   MLC

.

MLC   .

TN(-   )   ,   :

-                    (   ),

-                            (,   ,   ),

-                        (   ).

.

(STN)   ,   (multiplexibility)   /   /

(   )   .   ,   (,   -

,   ,   )   .

MLC, TN   STN   .

,   ,   .

1   ,

:

1

R   ,   1   15   (, CN   CF₃

)   ,
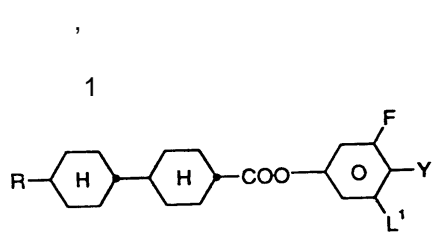
-O-, -S-,   , -CO-, -CO-O-, -O-CO-   -O
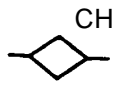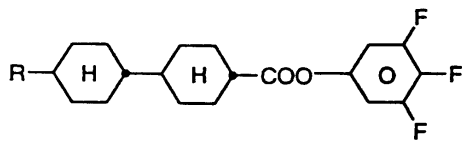-CO-O-   ,
Y   F, Cl,   1   6   ,   ,
L¹   H   F   .

- 3 -

1

1 / / /

1

O 387 032 :

R—H—H—COO—O(F)(F)(F)

(I) , Y F, Cl, OCF $_3$, OCHF $_2$, CF $_3$, CHFCF $_3$, CF $_2$ CHF $_2$, C $_2$ H $_4$ CHF $_2$, CF $_2$ CH $_2$ CF $_3$, CHF $_2$, OCH $_2$ CF $_3$, OCH $_2$ CHF $_2$, OCF $_2$ CHF $_2$, O(CH $_2$) $_3$ CF $_3$, OCH $_2$ C $_2$ F $_5$, OCH $_2$ CF $_2$ CHF $_2$, OCH $_2$ C $_3$ F $_7$, OCHFCF $_3$, OC $_2$ F $_5$, OCF $_2$ CHFCF $_3$, OCH=CF $_2$, OCF=CF $_2$, OCF=CFCF $_3$, OCF=CF- C $_2$ F $_5$, CH=CHF, CH=CF $_2$, CF=CF $_2$, CF $_2$ OCF $_3$, F, OCHFCF $_3$, OCF $_3$, OCHF $_2$, OC $_2$ F $_5$, OC $_3$ F $_7$, OCH=CF $_2$ CF $_2$ OCF $_3$.

Y L ^{1} F 1 .

R / , . 2, 3, 4, 5, 6 7

2- (=), 2- (=) 3- (= 2-), 2-, 3- 4 -, 2-, 3-, 4- 5- , 2-, 3-, 4-, 5- 6- , 2-, 3-, 4-, 5-, 6- 7- , 2-, 3-, 4-, 5-, 6-, 7- 8- , 2-, 3-, 4-. 5-, 6-, 7-, 8- 9- .

R CH $_2$ - CH=CH- , .
, 2 10 . , , - 1 - 2- , - 1-, - 2- - 3- , - 1-, - 2-, - 3, - 4- , - 1-, - 2-, - 3-, - 4- - 5- , - 1-, - 2-, - 3-, - 4-, - 5- - 6- , - 1-, - 2-, - 3-, - 4-, - 5-, - 6- - 7- , - 1-, - 2-, - 3-, - 4-, - 5-, - 6-, - 7- - 8- , - 1-, - 2-, - 3-, - 4-, - 5-, - 6-, - 7-, - 8- - 9- .

R CH $_2$ - O- , CH $_2$ - CO- , . - CO- O- - O- CO- . , 2 6
, 2- , 2- , 2- , 3- , 3- , 4- , , 2- ( ) , 2- ( ) , 2- ( ) , 3- ( ) , 3- ( ) 4- ( ) .

R CH $_2$ - CH=CH- , CH $_2$ CO CO- O O- CO , . 4 13
. , 2- , 3- , 4- , 5- , 6- , 7- , 8- , 9- , 10- , 2- , 3- , 4- , 5- , 6- , 7- , 8- 9- .

R CN CF $_3$, . CN CF $_3$.
R , , F Cl . , F . , , - .

R 1 .
R 1 , . .

S $_A$ 1 .
R , 2- (= 1 -), (= 2-), 2- , (= 3-), 2- , 3- , 2-

, 2-   , 2-   , 2-   , 3-   , 2-   , 3-
2-   , 1-   1-   .
R   2   CH $_2$ - O-   /   - CO- O   ,
.   3   12   .   , 2,2-
, 3,3-   , 4,4-   , 5,5-   , 6,6-   , 7,7-   , 8,
8-   , 9,9-   , 10,10-   ,   (   )   , 2,2-   (   )
, 3,3-   (   )   , 4,4-   (   )   , 5,5-   (   )   , 6,6-   (
)   , 7,7-   (   )   , 8,8-   (   )   ,   (   )   , 2,2-   (
)   , 3,3-   (   )   , 4,4-   (   )   5,5-   (   )
.

1   (, [Houben- Weyl, Methode
n der Organischen Chemie, Georg- Thieme- Verlag, Stuttgart]   )

.   ,

1   :
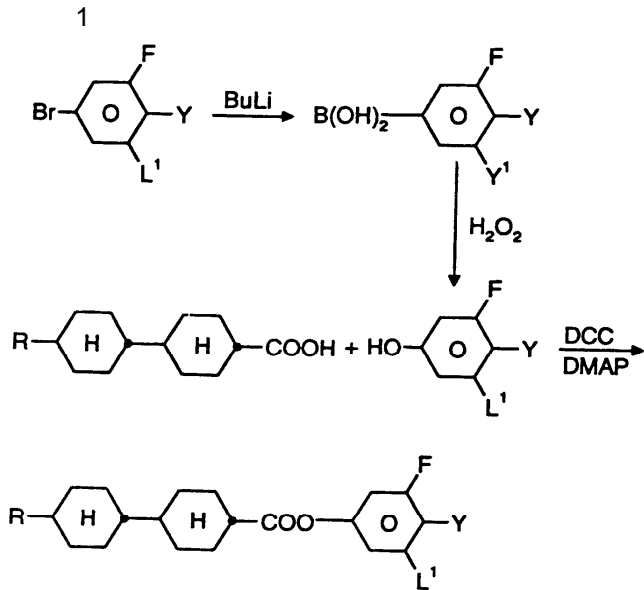
(,   2
,   ,
STN   MLC   )
.   .
,   ,   ,
.   .
, ZLI- 3119   ,   + 3
.
, 60   .
- 20   - 30 ,   - 40
, 80   ,   90   ,   100
6,   8   ,   STN   MLC   .
,   . TN   2.0 V   ,   1.5 V   ,
< 1.3 V   .
,
(110°   )
.
.   MLC   (Gooch)   (Tarry)   1
[C.H. Gooch and H.A. Tarry, Electron. Lett. 10, 2- 4, 1974; C.H. Gooch and H.A
. Tarry, Appl. Phys., Vol. 8, 1575- 1584, 1975];   ,
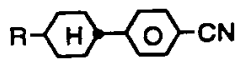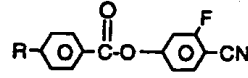(30 22 818   )
2   .   .

MLC   .

20   < 60 mPa.s   , < 50 mPa   .   90°   ,
    100°   .   - 20°   + 80°   .
'   '('capacity holding ratio', HR)   [S. Matsumoto et al., Liquid Crystals _5_ , 1320(1989);
K. Niwa et al., Proc. SID Conference, San Francisco, June 1984, p. 304(1984); G. Weber et al., Liquid Crystal
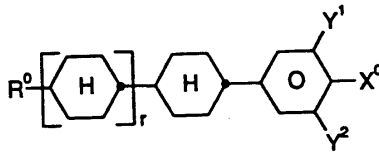s _5_ , 1381 (1989)]   1   1
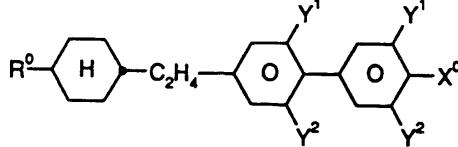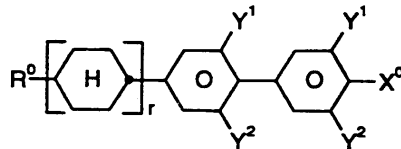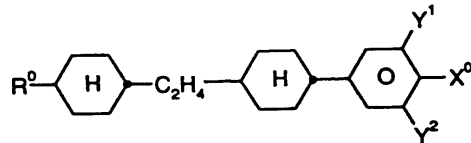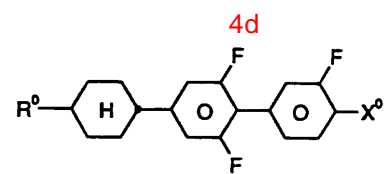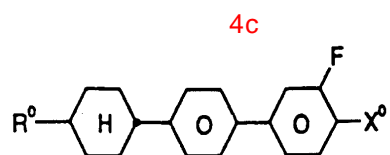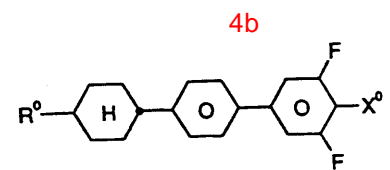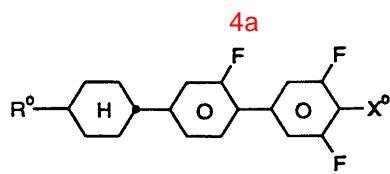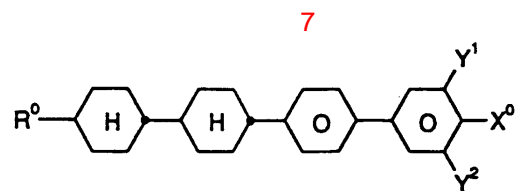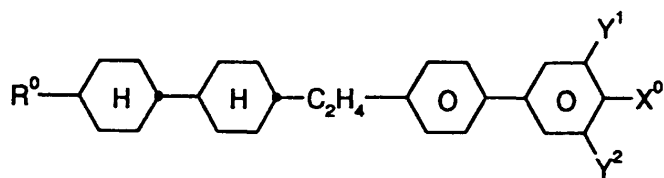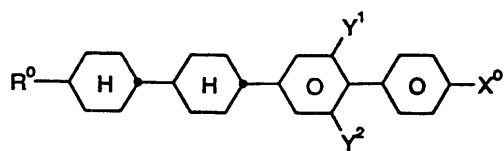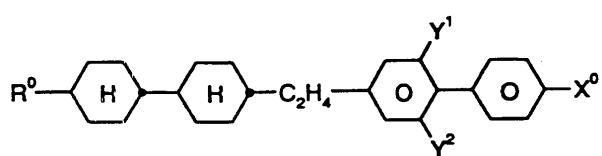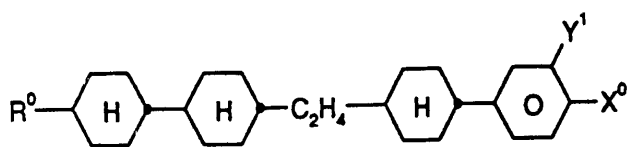

                                                HR   .
                                                            ,   HR
                .   (2   )   1   ,
            5   95%,   10   60%   20   50%   .
                                        1   12
                                    .
                            :
-                          2   6   :
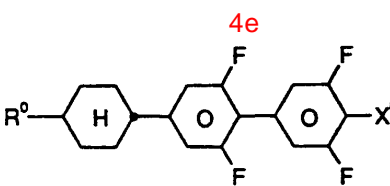
2

3

4

5

6

                ,   :

R°   9   n-   ,   ,   ,
X°   F, CI,   1   6   ,   ,
Y ^{1} Y ^{2}
r   0   1   .
              4   :

4a

4b

4c

4d

4e

-                          7   12   :

7

8

9

10

11

12

	, R°, X°, Y^1 Y^2				2		,	F, Cl, CF$_3$
, OCF$_3$, OCHF$_2$,		6			,	,	.
-	1	6			50	%	;
-	1		10	50	%	;
-	2	6		20	80	%	;

은 —◯—F, —◯—F, —◯—F,

—◯—OCF₃, —◯—OCF₃, —◯—OCF₃, —◯—CF₃,

—◯—CF₃, —◯—CF₃, —◯—OCHF₂, —◯—OCHF₂,

—◯—OCHF₂, —◯—Cl, —◯—Cl 또는 —◯—Cl ;

-          2, 3, 4, 5 / 6   ;
-                            ;

R⁰—(H)—(H)—(O)—F (with F, F) , R⁰—(H)—(H)—(O)—OCHF₂ (with F, (F)) 또는

R⁰—(H)—(H)—(O)—OCF₃ (with F, (F))

- R°   2   7   ;
-        1   6   ;
-                     17   ;

17

Rᵃ—(H)—(H)—Rᵇ

    , Rᵃ   Rᵇ   1   5   ;
-        1   6   17   ;
-            13   16   ;

13

R⁰—(O)—(O)—(O)—X⁰

14

R⁰—(O)—(O)—CH₂CH₂—(O)—X⁰ (with Y¹)

15

R⁰—(O)—CH₂CH₂—(O)—(O)—X⁰

16

R^0-⬡-⬡-C_2H_4-⬡-X^0 (X^0 = F 또는 Cl)
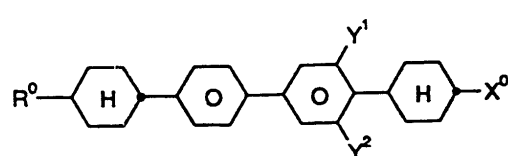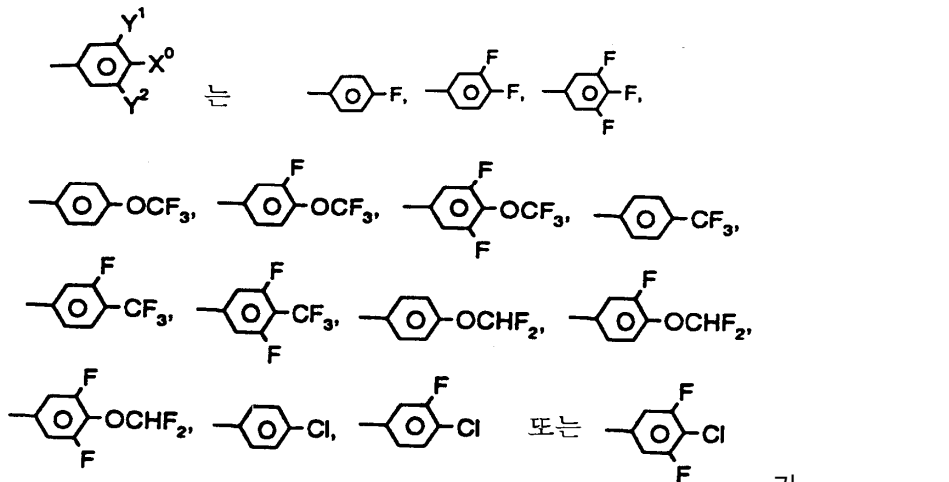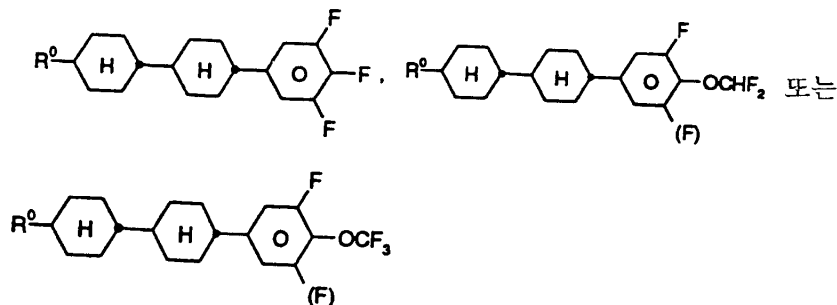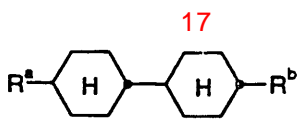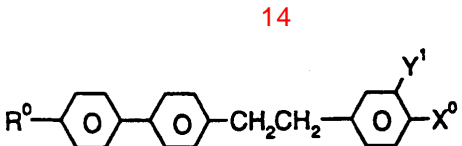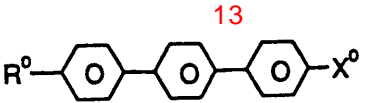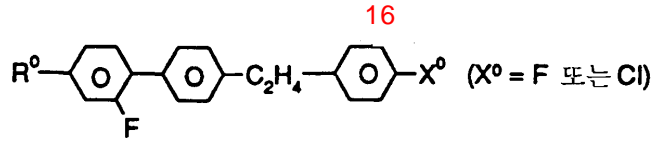
, R ^{0} X ^{0} , 1,4-   CN,   . 1,
4-   .
-        (1) :   2 + 3 + 4 + 5 + 6   1 : 10   10 : 1   .
-          1   12   .
                    1   ,   2, 3, 4, 5 /   6
          ,   ,   1   ,
        4   ,   X ^{0} F   OCF $_3$ 4a   .
      ,   1   6   ,   ,   .
'   '   1   7   ,   ,   ,   ,
                  .   2   5   .
'   '   2   7
        C $_2$ - C $_7$ - 1E-   , C $_4$ - C $_7$ - 3E-   , C $_5$ - C $_7$ - 4-   , C $_6$ - C $_7$ - 5-   C $_7$
- 6-   ,   C $_2$ - C $_7$ - 1E-   , C $_4$ - C $_7$ - 3E-   C $_5$ - C $_7$ - 4-   .
              , 1E-   , 1E-   , 1E-   , 1E-   , 1E-   , 3-   , 3E-   , 3E-
    , 3E-   , 4-   , 4Z-   , 4E-   , 4Z-   , 5-   , 6-   .   5
'   '   , 2-   , 3-   ,
4-   , 5-   , 6-   7-   .   ,
'   '   C $_n$ H $_{2n+1}$ - O- (CH $_2$) $_m$ (, n   m   1   6   )
                    . n   1   ,   m   1   6   .
R ^{0} X ^{0}
              .   , 1E-   , 3E-   , 2E-
                                                      k $_{33}$ (   ) k $_{11}$ (   )
                        . 4-   , 3-
                      k $_{33}$ / k $_{11}$.
- CH $_2$ CH $_2$ -   k $_{33}$ / k $_{11}$. k $_{33}$ / k $_{11}$
                  90°   TN   (
    ), STN, SBE   OMI   (   ),
        .
        1   2 + 3 + 4 + 5 + 6   ,   1, 2, 3, 4, 5 /
      6   .
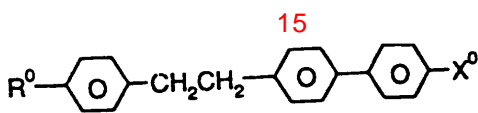   1   12   .   ,
                      .   ,
      1   12   X ^{0} F, OCF $_3$, OCHF $_2$, OCH=CF $_2$, OCF=CF $_2$ O
CF $_2$ - CF $_2$ H   2   6   (,   2, 3 /   4   )   .   1
                            .   ,   1   4a
                    .
    ,   MLC
                    .   ,   MLC
            ,   - Si TFT   MIM
    .
        ,
                                      .
                                                                    .   ,   ,
        ,   .

, ' . ,
0   15%   .
C   , S   , S $_c$ C , N   I   .
V $_{10}$ 10%   (   )   . t $_{on}$ V $_{10}$ 2.5
.   - , t $_{off}$ -   . n   n $_o$
.   (-   , ,   , 20   1
(, 0.5 d x n   ) T N   .   20   .

.   C $_n$H $_{2n+1}$ C $_{m2m+1}$ n   m   .
2   . 1a   1b   ,   R ^{1} , R ^{2} , L ^{1} L ^{2} .

R¹, R², L¹, L² 에 대한 약호	R¹	R²	L¹	L²
nm	C_nH_{2n+1}	C_mH_{2m+1}	H	H
nOm	C_nH_{2n+1}	OC_mH_{2m+1}	H	H
nO.m	OC_nH_{2n+1}	C_mH_{2m+1}	H	H
n	C_nH_{2n+1}	CN	H	H
nN.F	C_nH_{2n+1}	CN	H	F
nF	C_nH_{2n+1}	F	H	H
nOF	OC_nH_{2n+1}	F	H	H
nCl	C_nH_{2n+1}	Cl	H	H
nF.F	C_nH_{2n+1}	F	H	F
nF.F.F	C_nH_{2n+1}	F	F	F
nCF₃	C_nH_{2n+1}	CF_3	H	H
nOCF₃	C_nH_{2n+1}	OCF_3	H	H
nOCF₂	C_nH_{2n+1}	$OCHF_2$	H	H
nS	C_nH_{2n+1}	NCS	H	H
rVsN	$C_rH_{2r+1}-CH=CH-C_sH_{2s}-$	CN	H	H
rEsN	$C_rH_{2r+1}-O-C_2H_{2s}-$	CN	H	H
nAm	C_nH_{2n+1}	$COOC_mH_{2m+1}$	H	H
nOCCF₂.F.F	C_nH_{2n+1}	OCH_2CF_2H	F	F

1a, 1b   2   .

[1a]

R¹—⟨PYR⟩—⟨O⟩—R² **PYP**	R¹—⟨PYRP⟩—⟨O⟩—R² **PYRP**
R¹—⟨H⟩—⟨O⟩—⟨O⟩—R² **BCH**	R¹—⟨H⟩—⟨O⟩—⟨O⟩—⟨H⟩—R² **CBC**
R¹—⟨H⟩—⟨H⟩—R² **CCH**	R¹—⟨H⟩—⟨H⟩—⟨O⟩—R² **CCP**
R¹—⟨H⟩—⟨O⟩—C≡C—⟨O⟩—R² **CPTP**	
R¹—⟨H⟩—C₂H₄—⟨O⟩—C≡C—⟨O⟩—R² **CEPTP**	
R¹—⟨H⟩—⟨H⟩—C₂H₄—⟨O⟩—R² **ECCP**	R¹—⟨H⟩—C₂H₄—⟨H⟩—⟨O⟩—R² **CECP**

[1b]

R¹—(H)—C₂H₄—(O)—R² with L¹, L² **EPCH**	R¹—(H)—(O)—R² with L¹, L² **PCH**
R¹—(O)—C≡C—(O)—R² with L¹, L² **PTP**	R¹—(H)—C₂H₄—(O)—(O)—R² with L¹, L² **BECH**
R¹—(H)—(O)—C₂H₄—(O)—R² with L¹, L² **EBCH**	R¹—(H)—(O)—(H)—R² **CPC**
R¹—(O)—(O)—R² with L¹, L² **B**	R¹—(O)—(O)—C₂H₄—(O)—R² with F **FET-nF**
R¹—(H)—(O)—(O)—R² with F, F **CGG**	R¹—(H)—(O)—(O)—R² with F, F **CGU**
R¹—(H)—(H)—COO—(O)—R² with F, F **CCZU**	

[2]

C_nH_{2n+1} —(H)—(O)—(O)— X (with F substituent) **BCH-n.Fm**	
C_nH_{2n+1} —(H)— C_2H_4 —(O)—(O)— C_mH_{2m+1} (with F) **Inm**	
C_nH_{2n+1} —(H)—(O)—(O)—(H)— C_mH_{2m+1} (with F) **CBC-nmF**	
C_nH_{2n+1} —(H)— C_2H_4 —(O)— C_mH_{2m+1} **ECCP-nm**	C_nH_{2n+1} —(H)—(H)— CH_2O - C_mH_{2m+1} **CCH-n1EM**
C_nH_{2n+1} —(O)—(O)—(O)— C_mH_{2m+1} (with F) **T-nFm**	C_nH_{2n+1} —(H)—(O)—(O)—F (with F's) **CGU-n-F**
C_nH_{2n+1} —(H)—(H)—COO—(O)—F (with F's) **CCZU-n-F**	C_nH_{2n+1} —(H)—(O)—(O)—F (with F's) **CGG-n-F**

, m.p.   , c.p.   .   , C   , N   ,
S   , I   .   n   (589
nm, 20   )   ,   (mm ^{2} /)   20   .
'   ,   ,   ,   3 -   /
                      ,   ,   ,
                    .   :

DCC
DMAP
DMEU   1,3-   - 2-
POT   3 -
THF
pTsOH   p-   .

──────1

H$_7$C$_3$ —(H)—(H)—COO—(O)—F (with F's)
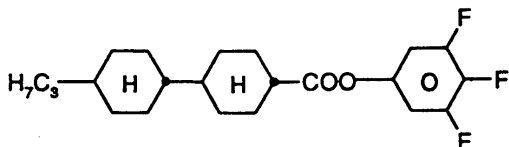
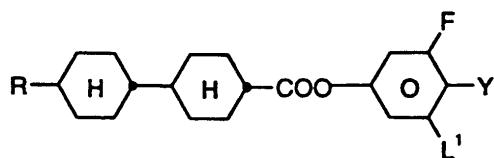   - 4- (4-   )   80   , 3,4,5-   0.1   DMAP 8.8
                     460 g   , DCC 88   .   .
                                            ,   .
                                .   ,   n-   .

C 56 N 117.2 I;   n = 0.070;   = 11.33
                              :

R¹	Y	L¹	
CH₃	F	H	
CH₃	F	F	
C₂H₅	F	H	
C₂H₅	F	F	C 80 N 81.3 I; Δn = +0.061; Δε = 11.02
n-C₃H₇	F	H	
n-C₄H₉	F	H	
n-C₄H₉	F	F	C 73 N 115.7 I; Δn = +0.069; Δε = 10.87
n-C₅H₁₁	F	H	
n-C₅H₁₁	F	F	C 72 N 123.1 I; Δn = +0.070; Δε = 10.71
n-C₆H₁₃	F	H	
n-C₆H₁₃	F	F	
CH₃	OCF₃	H	
CH₃	OCF₃	F	
C₂H₅	OCF₃	H	
C₂H₅	OCF₃	F	
n-C₃H₇	OCF₃	H	
n-C₃H₇	OCF₃	F	
n-C₅H₁₁	OCF₃	H	
n-C₅H₁₁	OCF₃	F	
n-C₆H₁₃	OCF₃	H	
n-C₆H₁₃	OCF₃	F	
CH₃	OCHF₂	H	
CH₃	OCHF₂	F	
C₂H₅	OCHF₂	H	
C₂H₅	OCHF₂	F	
n-C₃H₇	OCHF₂	H	

R^1	Y	L^1
$n\text{-}C_3H_7$	$OCHF_2$	F
$n\text{-}C_5H_{11}$	$OCHF_2$	H
$n\text{-}C_5H_{11}$	$OCHF_2$	F
$n\text{-}C_6H_{13}$	$OCHF_2$	H
$n\text{-}C_6H_{13}$	$OCHF_2$	F
CH_3	Cl	H
CH_3	Cl	F
C_2H_5	Cl	H
C_2H_5	Cl	F
$n\text{-}C_3H_7$	Cl	H
$n\text{-}C_3H_7$	Cl	F
$n\text{-}C_5H_{11}$	Cl	H
$n\text{-}C_5H_{11}$	Cl	F
$n\text{-}C_6H_{13}$	Cl	H
$n\text{-}C_6H_{13}$	Cl	F
CH_3	$OCHFCF_3$	H
CH_3	$OCHFCF_3$	F
C_2H_5	$OCHFCF_3$	H
C_2H_5	$OCHFCF_3$	F
$n\text{-}C_3H_7$	$OCHFCF_3$	H
$n\text{-}C_3H_7$	$OCHFCF_3$	F
$n\text{-}C_5H_{11}$	$OCHFCF_3$	H
$n\text{-}C_5H_{11}$	$OCHFCF_3$	F
$n\text{-}C_6H_{13}$	$OCHFCF_3$	H
$n\text{-}C_6H_{13}$	$OCHFCF_3$	F

R¹	Y	L¹
CH_3	$OCH = CF_2$	H
CH_3	$OCH = CF_2$	F
C_2H_5	$OCH = CF_2$	H
C_2H_5	$OCH = CF_2$	F
$n\text{-}C_3H_7$	$OCH = CF_2$	H
$n\text{-}C_3H_7$	$OCH = CF_2$	F
$n\text{-}C_5H_{11}$	$OCH = CF_2$	H
$n\text{-}C_5H_{11}$	$OCH = CF_2$	F
$n\text{-}C_6H_{13}$	$OCH = CF_2$	H
$n\text{-}C_6H_{13}$	$OCH = CF_2$	F
CH_3	OC_2F_5	H
CH_3	OC_2F_5	F
C_2H_5	OC_2F_5	H
C_2H_5	OC_2F_5	F
$n\text{-}C_3H_7$	OC_2F_5	H
$n\text{-}C_3H_7$	OC_2F_5	F
$n\text{-}C_5H_{11}$	OC_2F_5	H
$n\text{-}C_5H_{11}$	OC_2F_5	F
$n\text{-}C_6H_{13}$	OC_2F_5	H
$n\text{-}C_6H_{13}$	OC_2F_5	F

A

CCP-2F.F.F	13.0%	투명점 [℃] :	70
CCP-3F.F.F	9.0%	Δn [589 nm, 20°C] :	+0.0885
CCP-5F.F.F	7.0%	$\Delta \varepsilon$ [1 kHz, 20°C] :	12.9
CCP-3OCF₃	8.0%	$V_{(10,0,20)}$ [V] :	0.87
CGU-2-F	14.0%		
CGU-3-F	11.0%		
CGU-5-F	8.0%		
CCZU-3-F	20.0%		
CCZU-5-F	10.0%		

B

CCP-2F.F.F	10.0%	투명점 [℃] :	82
CCP-3F.F.F	9.0%	Δn [589 nm, 20°C] :	+0.0910
CCP-5F.F.F	5.0%	$\Delta \varepsilon$ [1 kHz, 20°C] :	12.6
CCP-3OCF₃	9.0%	$V_{(10,0,20)}$ [V] :	1.02
CCP-5OCF₃	8.0%		
CGU-2-F	12.0%		
CGU-3-F	11.0%		
CGU-5-F	6.0%		
CCZU-3-F	20.0%		
CCZU-5-F	10.0%		

C

CCP-2F.F.F	11.0%	투명점 [℃] :	+70
CCP-3F.F.F	10.0%	Δn [589 nm, 20°C] :	+0.0879
CCP-5F.F.F	6.0%	$\Delta \varepsilon$ [1 kHz, 20°C] :	12.5
CCP-3OCF$_3$	6.0%	$V_{(10,0,20)}$ [V] :	1.17
CCP-5OCF$_3$	4.0%	$(V_{90}/V_{10}-1) \cdot 100$ [%]	69.1
CGU-2-F	13.0%		
CGU-3-F	12.0%		
CGU-5-F	8.0%		
CCZU-2-F	7.0%		
CCZU-3-F	15.0%		
CCZU-5-F	8.0%		

D

CCP-3F.F.F	13.0%	투명점 [℃] :	+84
CCP-5F.F.F	8.0%	Δn [589 nm, 20°C] :	+0.0922
CCP-3OCF$_3$	8.0%	$V_{(10,0,20)}$ [V] :	1.34
CCP-5OCF$_3$	8.0%	$(V_{90}/V_{10}-1) \cdot 100$ [%]	63.6
CCP-3OCF$_2$.F.F	3.0%		
CGU-2-F	10.0%		
CGU-3-F	12.0%		
CGU-5-F	8.0%		
CCZU-2-F	7.0%		
CCZU-3-F	15.0%		
CCZU-5-F	8.0%		

E

CCP-2F.F.F	12.0%	투명점 [℃] :	+88
CCP-3F.F.F	13.0%	Δn [589 nm, 20°C] :	+0.0830
CCP-5F.F.F	8.0%	$V_{(10,0,20)}$ [V] :	1.44
CCP-2OCF$_2$.F.F	4.0%	$(V_{90}/V_{10}-1) \cdot 100$ [%]	64.4
CCP-2OCF$_3$	8.0%		
CCP-3OCF$_3$	8.0%		
CCP-5OCF$_3$	4.0%		
CGU-2-F	8.0%		
CGU-3-F	5.0%		
CCZU-2-F	7.0%		
CCZU-3-F	16.0%		
CCZU-5-F	7.0%		

F

CCP-2F.F.F	10.0%	투명점 [℃] :	+77
CCP-3F.F.F	10.0%	Δn [589 nm, 20°C] :	+0.0893
CCP-5F.F.F	4.0%	$V_{(10,0,20)}$ [V] :	1.03
CCP-3OCF$_3$	8.0%	$(V_{90}/V_{10}-1) \cdot 100$ [%]	61.8
CCP-4OCF$_3$	5.0%		
CCP-5OCF$_3$	3.0%		
CGU-2-F	12.0%		
CGU-3-F	12.0%		
CGU-5-F	6.0%		
CCZU-2-F	7.0%		
CCZU-3-F	16.0%		
CCZU-5-F	7.0%		

G

CCP-2F.F.F	3.0%	투명점 [℃] :	+75
CCP-3F.F.F	12.0%	Δn [589 nm, 20°C] :	+0.0947
CCP-3OCF$_3$	8.0%	$\Delta \varepsilon$ [1 kHz, 20°C] :	12.1
CCP-5OCF$_3$	8.0%	$V_{(10,0,20)}$ [V] :	0.99
CGU-2-F	12.0%	$(V_{90}/V_{10}-1) \cdot 100$ [%]	61.6
CGU-3-F	12.0%		
CGU-5-F	7.0%		
CCZU-2-F	7.0%		
CCZU-3-F	16.0%		
CCZU-5-F	7.0%		
BCH-2F.F	8.0%		

H			
PCH-7F	1.5%	투명점 [℃] :	+77
CCP-2F.F.F	8.0%	Δn [589 nm, 20°C] :	+0.0861
CCP-3F.F.F	10.0%	$\Delta \varepsilon$ [1 kHz, 20°C] :	+11.2
CCP-5F.F.F	5.0%	$V_{(10,0,20)}$ [V] :	1.17
CCP-2OCF$_3$	9.0%		
CCP-3OCF$_3$	6.0%		
CCP-5OCF$_3$	4.0%		
CGU-2-F	9.0%		
CGU-3-F	8.5%		
CGU-5-F	10.0%		
CCH-35	6.0%		
CCZU-2-F	3.0%		
CCZU-3-F	18.0%		
CCZU-5-F	2.0%		

MLC, TN   STN

(57)

1.   1   17   ,
                                           :

1

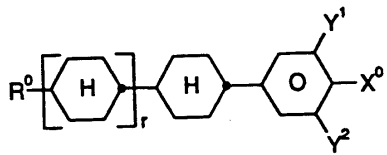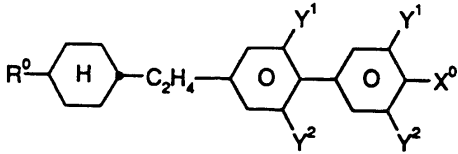
17
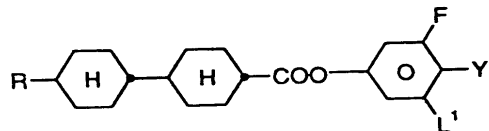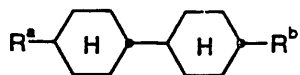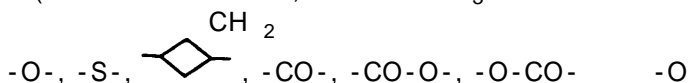
R   ,   1   15   (, CN   CF$_3$
)   ,   CH$_2$
                                    -O-, -S-, ◇ , -CO-, -CO-O-, -O-CO-   -O
-CO-O-   ,
Y   F, Cl,   1   6   ,
L^1 F   ,
R^a R^b 1   5   .
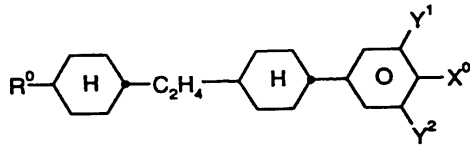   2.

1

2, 3, 4, 5   6

:

2

R⁰─[H]ᵣ─H─O(Y¹)(Y²)─X⁰

3

R⁰─H─C₂H₄─O(Y¹)(Y²)─O(Y¹)(Y²)─X⁰

4

R⁰─[H]ᵣ─O(Y¹)(Y²)─O(Y¹)(Y²)─X⁰

5

R⁰─H─C₂H₄─H─O(Y¹)(Y²)─X⁰

6

R⁰─[H]ᵣ─H─C₂H₄─O(Y¹)(Y²)─X⁰

R° 7 n-
X° F, Cl, 1 6
Y¹ Y²
r 0 1 .

3.

2

1 6 50 %

4.

1 2

1 5 95 %

5.

2 3

2 6 20 80 %

6.

1

:

R⁰─H─H─O(Y¹)(Y²)─X⁰

X⁰ F, OCHF₂ OCF₃
Y¹ Y² H F
R⁰ 7 n- .

7.

    ¹   .

8.

¹   .