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(54) Title: COATING COMPOSITION CONTAINING A HUMAN PHEROMONE COMPONENT

(57) Abstract: Coating compositions comprising a pheromone component which is advantageously a human pheromone component. The coating compositions having the incorporated human pheromone components causes a person exposed to the product to experience unique, mood altering effects. The effect may be an overall sense of well-being or one of heightened sexual attractiveness.

COATING COMPOSITIONS CONTAINING A PHEROMONE COMPONENT

FIELD OF THE INVENTION

The present invention relates to coating compositions comprising a pheromone component that is preferably a human pheromone component but it may be a dog, cat or other animal pheromones alone or in combination. The coating compositions include those with pigments or dyes or other additives.

BACKGROUND

Pheromones

Pheromones are chemicals emitted by living organisms to send messages to individuals of the same species. The classes most widely explored are the sex pheromones produced by female moths which are used to attract conspecific males for mating. Bombykol, the sex pheromone of the silkmoth, was first synthesized in 1959.

Most pheromones consist of blends of two or more chemicals which need to be emitted at exactly the right proportions to be biologically active. The female effluvia or sex gland can contain additional compounds which are related to the pheromone components and whose biological function is often unclear. On the other hand, many attractants of male moths have been discovered simply by field screening. In several cases it could later be shown that the attractant found with this technique was identical to the natural pheromone produced by the female. In most others, the composition of the true pheromone is still unknown.

While it is known that pheromone systems exist in insects, an increasing number of studies have shown that pheromones play a role in many species, including humans. Pheromones in humans are believed to be produced by the apocrine glands. These glands become functional after reaching puberty, which could explain why most people develop an attraction for others at that time. Pheromones could also be the reason why a person can sense "chemistry", or feel an instant attraction or dislike when first meeting someone.

Certain compounds believed to have pheromone properties affect a specific behavioral or physiological response in human subjects, e.g., a reduction of negative affect, mood, and character traits. In one particular example, nasal

administration provides for contacting neurochemical receptors of a heretofore poorly understood neuroendocrine structure, commonly known as the vomeronasal organ ("VNO); also known as "Jacobson's organ"), with one or more steroid(s) or with compositions containing the steroid(s). This organ is accessed through the nostrils of most higher animals--from snakes to humans, and has been associated, inter alia, with pheromone reception in certain species (see generally Muller-Schwarze & Silverstein, Chemical Signals, Plenum Press, New York (1980)). The axons of the neuroepithelia of the vomeronasal organ, located supra palatinal, form the vomeronasal nerve and have direct synaptic connection to the accessory olfactory bulb and indirect input from there to the cortico-medial amygdaloid basal forebrain and hypothalamic nuclei of the brain. The distal axons of terminalis nerve neurons may also serve as neurochemical receptors in the VNO. Stensaas, L. J., et al., J. Steroid Biochem. and Molec. Biol. (1991) 39:553. This nerve has direct synaptic connection with the hypothalamus.

Coatings

The present invention provides coatings that may be used as substantially invisible or visible coating and inks for various applications including printing on packaging, magazines, newsprint, displays, and other known uses of coatings and inks. Coatings and inks are commonly used in printers including ink jet printers, flexography, hand applicators such as pens and brushes, and others. Coatings and inks are also used in large formats for coating paper, plastics, metal, wood and other materials.

There exists various types of inks including ink using water or an aqueous medium as a solvent and dye or pigment as a colorant, inks using an organic medium such as oil as a solvent and dye or pigment as a colorant and inks using water or a water-soluble medium as a solvent, dye or pigment as a colorant and a pseudoplasticizing additive so that the ink may have pseudoplasticity. The inks may be conductive, phosphorescent, fluorescent and may comprise other functional components such as therapeutics, magnetic or conductive.

For all coatings, the types of solvents and additives used are determined to provide the appropriate viscosity in a static state, in non-static states and when a shearing force is applied depending on the application. The flow characteristics of the coatings, along with the coverage, intensity, density, vividness, hue and cost

are important for the type of coating application and the method of coating. Different surfaces require different coatings and different methods of coating which are known in the arts.

For example, the aqueous-gel ballpoint pen has advantages that it can write smoothly at a low writing pressure, that the figures written are hard to blur and that blotting is less likely to occur.

Flexography is the major process used to print packaging materials. Flexography is used to print corrugated containers, folding cartons, multiwall sacks, paper sacks, plastic bags, milk and beverage cartons, disposable cups and containers, labels, adhesive tapes, envelopes, newspapers, and wrappers (candy and food).

In the typical flexographic printing sequence, the substrate is fed into the press from a roll. The image is printed as substrate is pulled through a series of stations, or print units. Each print unit is printing a single color. As with Gravure and Lithographic printing, the various tones and shading are achieved by overlaying the 4 basic shades of ink. These are magenta, cyan, yellow and black. Magenta being the red tones and cyan being the blue.

The major unit operations in a flexographic printing operation are image preparation, platemaking, printing, finishing and image preparation.

Typical image preparation begins with camera-ready (mechanical) art/copy or electronically produced art supplied by the customer. Images are captured for printing by camera, scanner or computer. Components of the image are manually assembled and positioned in a printing flat when a camera is used. This process is called stripping. When art/copy is scanned or digitally captured the image is assembled by the computer with special software. A simple proof (brown print) is prepared to check for position and accuracy.

Common flexographic and letterpress plates are made using the same basic technologies utilizing a relief type plate. Both technologies typically employ plates with raised images (relief) and only the raised images come in contact with the substrate during printing. Flexographic plates are made of a flexible material, such as plastic, rubber or UV sensitive polymer (photopolymer), so that it can be attached to a roller or cylinder for ink application. There are three primary methods of making flexographic plates; photomechanical, photochemical and laser engraved plates.

The five common types of printing presses used for flexographic printing are the stack type, central impression cylinder (CIC), in-line, newspaper unit, and dedicated 4-, 5-, or 6-color unit commercial publication flexographic presses. All five types employ a plate cylinder, a metering cylinder known as the anilox roll that applies ink to the plate, and an ink pan. Some presses use a third roller as a fountain roller and, in some cases, a doctor blade for improved ink distribution.

Flexographic inks are very similar to packaging gravure printing inks in that they are fast drying and have a low viscosity. The inks are formulated to lie on the surface of substrates and solidify when solvents are removed. Solvents are removed with heat, unless UV curable inks are used.

After printing, the substrate may run through a number of operations to be "finished" and ready for shipment. Finishing may include operations such as coating, cutting, folding and binding. The pheromone component may also be added to any coatings applied.

In ink-jet coating, coating or ink droplets are formed by using the ink discharge method including, for example, the electrostatic attraction method, a method in which mechanical vibration or displacement is applied to the ink by using a piezoelectric element, and a method in which bubbles are generated by heating the ink to utilize the pressure generated thereby, and all or a part of the ink droplets are adhered to a recording medium such as paper.

Recently, the ink-jet recording method has come into widespread use since the ink-jet recording method involves neither development process nor fixation process, and it is easy to effect the color printing. Today, high-definition printing and high speed printing are well advanced and realized by using the ink-jet printer. For example, the color printer, which is capable printing on regular paper, is dominantly used.

In general, the ink used for the ink-jet recording is typically oil base ink, water base ink or solid (fusion-type) ink. In the case of the oil base ink, the wettability is satisfactory with respect to the inner wall of the head of the ink-jet printer, and it is possible to perform stable jetting operations. However, at present, water base ink is dominantly used.

When a colorant is used, which for the present invention is not necessary, a solvent for dissolving or dispersing a colorant is essential to an ink composition. A mixed solvent composed of water and a water-soluble organic solvent has been

extensively used as the solvent from the viewpoint of safety. Upon the application of an ink composition on a recording medium, the solvent penetrates the recording medium or evaporates to permit the colorant component to be fixed onto the recording medium, thereby recording letters or other images on the recording medium. Various properties are required of the formed images, and examples thereof include no feathering or bleeding of images, excellent color development, no blurring of images upon contact with water (that is, good in waterfastness), less tendency to cause a deterioration in images upon rubbing (that is, good in rubbing/scratch resistance), and no color change of images with the elapse of time (that is, good in lightfastness).

The coloring agent used in such an ink for inkjet recording is required to have high solubility in a solvent, enable high-density recording, provide good color, exhibit excellent fastness to light, heat, air, water and chemicals, ensure good fixing on an image-receiving material and less bleeding, give an ink having excellent storability, have high purity and no toxicity, and be available at a low cost. Various dyes and pigments are used and known for inkjet use.

As the color image-forming agent having excellent durability, a pigment is generally superior to a dye, however, in the case of a dispersion-type ink using a pigment, the image is inferior in the transparency (particularly, in the high-density area) or image quality.

Ink-jet printer technique typically uses inks of several basic colors that are converted into minute liquid droplets of several picoliters to several tens picoliters, and the minute liquid droplets are selectively landed on the substrate so that an image is formed. For example, by means of the bubble system in which the inks are discharged from minute nozzles by using bubbles generated by rapid heating operation, or the piezoelectric system in which the inks are discharged from minute nozzles by using piezoelectric elements which are deformable depending on application of voltage. There are electrostatic inkjet printers, and electrophotographic liquid developer.

The present invention provides a coating or ink composition containing a pheromone component comprising a human or animal pheromone, a solvent, possibly a colorant and may also contain a functional substance or electroconductive component such as a metal or polymer. In particular, one embodiment of the present invention provides a coloring material-dispersed ink

composition in which the pheromone and possibly another functional substance is combined with a coloring material such as a pigment or a dye, the ink composition exhibiting high dispersion stability, improvement in bleeding and feathering, and high fixability. The present invention also provides an image forming method and an image forming device using the above coloring material-dispersed ink composition.

The present invention provides for coatings used for a wide variety of substrates both porous such as paper and paperboard and non-porous such as polymer films and foils.

Also provided are substantially transparent coatings comprising a pheromone component. These coatings may be UV or infrared inks and dyes or transparent coatings. The coatings may also be applied using known methods including flexographic methods, ink-jet methods, spraying, dipping and painting. These transparent coatings may be conductive, phosphorescent, fluorescent and may comprise other functional components. The present invention may in addition to the pheromone component comprise loaded latex particle compositions containing an infrared, colored, UV, or transparent dye or pigment. Such transparent, infrared or UV compositions are particularly useful for making ink formulations which may be used for invisible markings.

The invention provides for the coating to be carried by a substrate that comprises a product, package, or any article. The substrate may be organic or non-organic. The coating on the substrate is a delivery mechanism to a subject and specifically the VNO of a subject. The coating of the present invention will cause a subject coming into contact with the coating to experience a unique, mood-altering effect. This effect may also be an overall sense of well-being.

As used herein, a "pheromone" is a substance that provides chemical means of communication between members of the same species through secretion and peripheral chemoreception. In mammals pheromones are usually detected by receptors in the vomeronasal organ of the nose. Commonly, pheromones effect development, reproduction and related behaviors. The pheromone compositions according to the present invention are intended to cause a change in human hypothalamic function, thereby altering certain behavior and physiology mediated by the hypothalamus of individuals.

In addition to physiological responses, pheromones can be identified by their species specific binding to receptors in the vomeronasal organ (VNO). Thus, human pheromones bind to human receptors. This can be demonstrated by measuring the change in the summated potential of neuroepithelial tissue in the presence of the pheromone. Human pheromones induce a change of at least about -5 millivolts in human neuroepithelial tissue of the appropriate sex (the binding of pheromones is generally sexually dimorphic, i.e., different in the effect of, or response to, a compound or composition between males and females of the same species). Human pheromones induce sexually dimorphic changes in receptor binding potential in vivo in the human VNO. Naturally occurring human pheromones can be extracted and purified from human skin and they can also be synthesized. "Human pheromones" are pheromones which are naturally occurring in humans and effective as a specifically binding ligand in human VNO tissue, regardless of how the pheromone was obtained. Thus, both a synthesized and purified molecule may be considered a human pheromone.

The present invention provides the application of pheromone compositions to a substrate as a coating or ink. The pheromone compositions are deposited on the substrate. Additionally, the pheromone component may be microencapsulated on the substrate.

Micro-encapsulation is a process in which tiny particles or droplets are surrounded by a coating to give small capsules with many useful properties. In a relatively simplistic form, a microcapsule is a small sphere with a uniform wall around it. The material inside the microcapsule is referred to as the core, internal phase, or fill, whereas the wall is sometimes called a shell, coating, or membrane. Most microcapsules have diameters between a few micrometers and a few millimeters. Many microcapsules however bear little resemblance to these simple spheres. The core may be a crystal, a jagged adsorbent particle, an emulsion, a suspension of solids, or a suspension of smaller microcapsules. The microcapsule even may have multiple walls.

The pheromone composition coating may be deposited by any known coating method including but not limited to dipping, brushing, spraying, rolling, depositing, laminating and extruding. The pheromone composition may also be deposited between layers of a composite package and may be suspended in or

provided in a matrix of an adhesive, ink, color solution or other component applied to or incorporated within packaging.

The present invention is not limited in the pheromone composition used. Exemplary pheromone compounds include, but are not limited to, copulins (such as short chain aliphatic acids), estrene steroids, vomeropherins, such as 19-nor-cholane steroids, 19-nor-pregnane steroids such, and androstene and androstenedione compounds. Metabolites of the above-recited human pheromone compounds are also contemplated.

Upon the VNO sensing of the pheromone as a coating in accordance with the present invention, the human pheromone will exert its effect by altering hypothalamic function of an individual. Such alteration of hypothalamic function will bring about physiological and behavioral functions of individuals which are normally regulated by the hypothalamus. The changes in physiological functions may cause the individual exposed to the packaging product to experience a unique, mood-altering effect or an overall sense of well-being and/or heightened sexual attractiveness.

It has been found that certain human pheromones have a distinct effect on men and others on women, i.e., the compounds are sexually dimorphic. As such, the present invention is not limited to the use of a specific pheromone compound within the packaging product and it is contemplated that certain packaging products directed for men will contain a human pheromone compound different from the packaging product directed for women or that a single product may contain a mix of human pheromone compounds. However, the present invention is not limited to the type of pheromone be it human or otherwise.

CLAIMS

What is claimed is:

1. A coating composition comprising a pheromone component.
2. The coating as recited in claim 1, wherein the pheromone component is a human pheromone.
3. The coating as recited in claim 1 further comprising an aqueous medium and a colorant.
4. The coating as recited in claim 3, wherein the aqueous medium is water.
5. The coating as recited in claim 1 further comprising and organic medium and colorant.
6. The coating as recited in claim 5, wherein the organic medium is an oil or oil-based solvent.
7. The coating as recited in claim 1 further comprising a plasticizing or pseudoplasticizing additive.
8. The coating as recited in claim 1, wherein the coating is an ink.
9. The coating as recited in claim 8, wherein the ink is visible or invisible.
10. The coating as recited in claim 8, wherein the ink is phosphorescent.
11. The coating as recited in claim 8, wherein the ink is fluorescent.
12. The coating as recited in claim 8, wherein the ink is conductive.
13. The coating as recited in claim 1, wherein the pheromone component is microencapsulated in the coating.
14. The coating as recited in claim 8, wherein the ink is incorporated into writing implements.
15. The coating as recited in claim 8, wherein the ink is incorporated into cartridges.
16. The coating as recited in claim 1 for incorporation into a substrate.
17. The coating as recited in claim 16, wherein the substrate may be selected from the group consisting of paper, packaging material, plastic, polymeric material, metal and wood.
18. The coating as recited in claim 2, wherein the human pheromone compound is selected from the group consisting of 19-nor-cholane compounds, 19-nor-pregnane compounds, estrene steroids, short chain

aliphatic acids, androstadienone steroids, androstene, androstane and androstenedione compounds, combinations thereof and metabolites thereof.

19. A method for coating a substrate with a composition comprising a pheromone component, the method comprising applying the coating on the substrate via a technique selected from the group consisting of: dipping, brushing, spraying, rolling, laminating and extruding.

20. The method as recited in claim 19, wherein the composition may be deposited between layers of the substrate.

21. The method as recited in claim 19, wherein the composition may be suspended in or provided in a matrix of an adhesive, ink, color solution or other component and applied to or incorporated within the substrate.

22. The method as recited in claim 19, wherein the composition is microencapsulated and suspended within an aqueous or organic medium.

23. The method as recited in claim 19, wherein the pheromone component is selected from the group consisting of: 19-nor-cholane compounds, 19-nor-pregnane compounds, estrene steroids, short chain aliphatic acids, androstadienone steroids, androstene, androstane and androstenedione compounds, combinations thereof and metabolites thereof.