TITLE OF THE INVENTION

INK FOR FORMING A RECEIVING LAYER AND PRODUCT USING THE SAME

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an ink for forming a receiving layer and products using the same.

Description of the Prior Art

A receiving layer has been printed or coated on a substrate to get faster absorption of an ink and to lessen smears when substrates such as paper, film, and board are printed with ink-jets. An ink for forming a receiving layer is made by dissolving a water-soluble polymer in an aqueous medium and by adding a filler such as silica, alumina, and aluminium hydroxide.

An ink that is made by adding a water-absorbing filler to a liquid water-soluble monomer and cure said ink has also been proposed.

SUMMARY OF THE INVENTION

The object of the present invention is to provide an ink for forming a receiving layer which contains a novel agent to enhance the receiving property. Another object of the present invention is to provide both a ink for forming a receiving layer that contains a novel agent to enhance the receiving property having other functions beside of the properties to enhance the receiving property which are usually given by traditional materials such as silica, Alumina, Aluminium hydroxide and water absorbing organic material and a product in which said ink is used. Namely, the present invention provides both an ink for forming a layer that contains an agent to enhance a property to receive an ink-jet ink and to confer a phosphorescent property, and a product in which said ink is used.

The present invention provides in a first aspect, in an ink adapted to form an ink-jet ink receiving layer on a substrate, the use of a phosphorescent pigment as an ink-jet ink receiver.

The present invention also provides a product to receive an ink-jet ink, said product being printed or coated with an ink for forming a receiving layer containing a phosphorescent pigment to enhance the receiving property on a substrate, and a product made by printing with an ink-jet ink on said product to receive said ink.

Phosphorescent pigments to be added to enhance the receiving property include commercial phosphorescent pigments such as an N luminescence phosphorescent pigment and an S luminescence phosphorescent pigment.

A phosphorescent pigment with a particle size of 0.5-50 μ m is used in general; preferably 5-35 μ m; most preferably 8-25 μ m. Using too smalll particle size tends to reduce the effect to enhance receiving property and the phosphorescent property. On the other hand, using too big particle size tends to give rough pictures in ink-jet printing and lower quality of image-printing.

The amount of the phosphorescent pigment to be added in an ink for forming a receiving layer according to the present invention in a second aspect is:
In general, Ink vehicle 100% weight: Phosphorescent pigment 5-120 weight %
preferably, Ink vehicle 100% weight: Phosphorescent pigment 15-90 weight %

An agent to enhance the receiving property may be used in combination of a phosphorescent pigment and known agents to enhance the receiving property such as water-absorptive organic material, silica, alumina, and aluminium hydroxide. Combinations of a phosphorescent pigment and water-absorptive organic materials such as protein powder, cellulose powder, and water-absorbing polymer powder give excellent results.

A preferable binder that is used in an ink for forming a receiving layer according to the present invention is a hydrophilic polymer. As said hydrophilic polymer, non-water-soluble polymers having hydrophilic groups that reduce a water-repelling property are preferably used as well as water-soluble polymers. Water-soluble monomers and water-soluble monomers to which various oligomers or polymers were dissolved can be preferably used as a binder in curable inks such as a UV-curable ink.

Various additives which are used in normal inks may be added.

Products for receiving ink-jet inks can be produced by printing or coating on various substrates. Said printing or coating includes screen printing, gravure printing, flexography, typography, spray coating, and roll coating. Printing with solvent-based inks accompanies solvent-drying; printing with UV-curable inks UV-exposure, etc.

Thickness of a printed layer for receiving is 1-100 μ m in general, preferably 5-50 μ m. Therefore, a layer for receiving can be printed preferably

by methods such as screen printing.

Synthetic polymers are preferably used as the substrate for products for receiving. Said synthetic polymers include polycarbonate, polyvinylchloride, polyester, polyolefin, ABS resin, acryl resin, and setting resin. Although these resins have low ink-jet ink-receiving properties in general, products for receiving having both very excellent ink-jet ink-receiving and phosphorescent properties can be produced by printing with the inks for forming a receiving layer according to the present invention.

If the synthetic resin substrate is an information-recording medium, products with extremely high additional value can be produced. Namely, as information-recording media such as compact discs according to the present invention have both ink-jet ink-receiving and phosphorescent properties, those media have such an advantages that various designs as well as displays of usage and properties of said disc can be printed and be seen even in the dark.

The present invention confers ink-jet ink-receiving and phosphorescent properties to inks and enables one to read in the dark and to enhance an ink-jet ink-receiving property.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Products having the receiving properties according to the present invention and a control product were compared with respect to some properties.

Ink I for forming a receiving layer according to the present invention(Embodiment 1):

N luminescence phosphorescent pigment (average particle size 15 μm)	15.0 wt%
Water-absorbing organic filler	15.0 wt%
Photo-reactive acryl oligomer	20.0 wt%
Photo-reactive monomer	43.0 wt%
Photo initiator	5.0 wt%
Additive	2.0 wt%

Ink II for forming a receiving layer according to the present invention(Embodiment 2)

N luminescence phosphorescent pigment (average particle size 15 μ m)	30.0 wt%
Photo-reactive acryl oligomer	20.0 wt%
Photo-reactive monomer	43.0 wt%
Photo initiator	5.0 wt%
Additive	2.0 wt%

Ink III for control:

Photo-reactive acryl oligomer	45.0 wt%
Photo-reactive monomer	48.0 wt%
Photo initiator	5.0 wt%
Additive	2.0 wt%

CD-R substrates were screen-printed at 300 mesh with inks of the embodiments 1 and 2 and the control, and inks were cured by exposure to UV-light to give products with a film thickness of 15 μ m. Resulting substrates were printed with ink-jet printer A (Canon Co., Ltd.) and ink-jet printer B (Epson Co., Ltd.). Printing properties of the substrates were observed both in the light and in the dark. The result of the observation are summarized in Table 1 (Symbols: ◎, excellent; ○, very good; ×, not good).

[Table 1]

	Ink I	Ink II	Ink III
Printing property by ink-jet printer A	◎	○	×
Printing property by ink-jet printer B	◎	○	×
Observation in the dark	Disc can be seen Printed letters can be read	Disc can be seen Printed letters can be read clearly	Disc can not be seen Printed letters can not be read

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When ink I was used, the printing property was excellent: the disc was seen and printed letters can be read in the dark. When ink II was used, the printing property was very good: the disc was seen and printed letters can be read clearly in the dark. When ink III was used, however, the printing property was not good: the disc was not seen and printed letters can not be read in the dark.

WHAT IS CLAIMED IS:

1. In an ink adapted to form an ink-jet ink receiving layer on a substrate, the use of a phosphorescent pigment as an ink-jet ink receiver.

2. An ink adapted to form an ink-jet ink receiving layer on a synthetic resin substrate, wherein said ink contains a phosphorescent pigment to improve an ink-jet ink receiving property, the relative amount of ink vehicle to phosphorescent pigment being:
Ink vehicle 100 weight %: Phosphorescent pigment 5-120 weight %.

3. An ink as claimed in claim 2 wherein the amount is:
Ink vehicle 100 weight %: Phosphorescent pigment 15-90 weight %.

4. An ink for forming a receiving layer according to any one of claims 1 to 3, wherein average diameter of said pigment is 5-35 μ m.

5. An ink for forming a receiving layer according to any one of the preceding claims, wherein said ink contains both a phosphorescent pigment and a water-absorptive or water-absorbing organic filler.

6. An ink for forming a receiving layer according to any one of the preceding claims, wherein said ink contains a hydrophilic polymer.

7. An ink-jet ink-receiving product which was printed or coated with an ink for forming a receiving layer according to any one of the preceding claims on a substrate.

8. An ink-jet ink-receiving product according to claim 7, wherein said substrate is made of a synthetic resin.

9. An ink-jet ink-receiving product according to claim 8, wherein said synthetic resin substrate is an information-recording medium.

10. A printed product produced by printing a receiving product according to claims 7, 8, 9 with an ink-jet ink.