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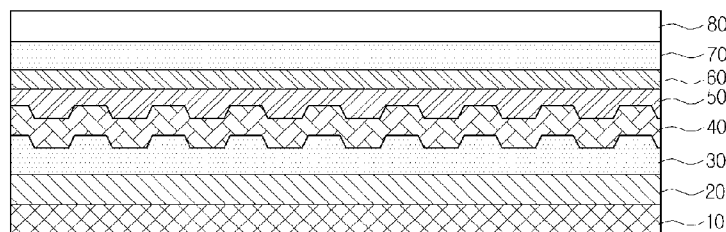
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(54) Title: SECURITY FILM

[Fig. 1]



(57) Abstract: Provided is a security film, and more particularly, a security film being not easily damaged by abrasion caused by frequent contact or washing, and having excellent long-term durability.

Description

Title of Invention: SECURITY FILM

Technical Field

- [1] The present invention relates to a security film. More particularly, the present invention relates to a security film usable in a gift card or a bill.

Background Art

- [2] Security documents such as a gift card, a banknote, a bill, and the like may be damaged by moisture or chemicals during handling, and thus, preferably have moisture resistance and chemical resistance. In particular, even under extreme conditions including abrasion caused by frequent contact, or wash by mistake, a security film coated on a substrate forming the security document should not be easily damaged.
- [3] Generally, the security film applied to the security document includes a hologram film, and this hologram consists of multilayers.
- [4] In the hologram film, an aluminum deposition layer is formed on a relief structure layer representing a hologram. Here, in the case that adhesiveness between the aluminum deposition layer and the relief structure layer is weak, so that the security film as mentioned above is exposed to extreme conditions, the aluminum deposition layer is easily released. In addition, in the case of a hologram film for a bill, a process of removing a deposition layer in which the aluminum deposition layer is partly peeled off depending on the design, is required, and adhesion is important on a part where the aluminum deposition layer should selectively remain.
- [5] Accordingly, there is current need to study and develop a security film having long-term durability so that the security film is not easily damaged by abrasion caused by frequent contact and wash.

[6]

Disclosure of Invention

Technical Problem

- [7] The present invention was contrived in order to solve the above problems, and has an object to improve adhesiveness between a relief structure layer and a deposition layer within a security film including a hologram. That is, an object of the present invention is to provide a security film having excellent long-term durability, since the security film is not easily damaged by abrasion caused by frequent contact and wash.
- [8] Further, a deposition layer should selectively remain in a process step of etching the deposition layer carried out in some processes, and thus, another object of the present invention is to provide a security film allowing the deposition layer to be easily removed on a part where the deposition layer should not exist, and having excellent ad-

hesiveness on a part where the deposition layer should remain.

Solution to Problem

- [9] In one general aspect, a security film includes a base film layer, a release layer, a first protective layer, a relief structure layer, a deposition layer, a second protective layer, and an adhesive layer which are sequentially formed, wherein an adhesiveness enhancing layer is further included between the relief structure layer and the deposition layer.
- [10] In the security film according to an exemplary embodiment of the present invention, the adhesiveness enhancing layer may include any one or a mixture of two or more selected from the group consisting of a urethane-based compound, an acryl-based compound and an ester-based compound.
- [11] In the security film according to an exemplary embodiment of the present invention, the adhesiveness enhancing layer may have a dried coating thickness of 2 to 10% of a total thickness of the security film. Here, the dried coating thickness refers to a thickness after coating and drying.
- [12] In the security film according to an exemplary embodiment of the present invention, the release layer may be formed by coating a release composition including a polyurethane-based resin and a solvent, and have a coating amount of 0.03 ~ 0.15 g/m² after drying, and the release composition may have a solid content of 0.5 ~ 3.0 wt%.
- [13] In the security film according to an exemplary embodiment of the present invention, the polyurethane-based resin may be any one or more selected from the group consisting of polyurethane, polyether polyurethane and polycarbonate polyurethane.
- [14]

Advantageous Effects of Invention

- [15] The security film according to the present invention has an advantage in that adhesiveness between a relief structure layer and a deposition layer is improved.
- [16] Further, the present invention has an advantage in that the security film is not easily damaged by abrasion caused by frequent contact or wash, and has excellent long-term durability.
- [17] Further, the present invention has an advantage of excellent remaining and removal efficiency in that a deposition layer selectively remains when carrying out a process of etching a deposition layer in some processes.

Brief Description of Drawings

- [18] The above and other objects, features and advantages of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawing, in which:
- [19] FIG. 1 is a cross-sectional view of a security film according to an exemplary em-

bodiment of the present invention.

[20]

[21] [Detailed Description of Main Elements]

[22] 10: base film layer

[23] 20: release layer

[24] 30: first protective layer

[25] 40: relief structure layer

[26] 50: adhesiveness enhancing layer

[27] 60: deposition layer

[28] 70: second protective layer

[29] 80: adhesive layer

Best Mode for Carrying out the Invention

[30] Hereinafter, the security film of the present invention will be described in detail. The exemplary embodiments of the present invention described below are provided by way of example so that the idea of the present invention can be sufficiently transferred to a person skilled in the art. Further, technical terms and scientific terms used in the present specification have the general meaning understood by those skilled in the art to which the present invention pertains unless otherwise defined, and a description for the known function and configuration obscuring the present invention will be omitted in the following description and the accompanying drawings.

[31] The security film according to the present invention includes a base film layer, a release layer, a first protective layer, a relief structure layer, a deposition layer, a second protective layer, and an adhesive layer which are sequentially formed, wherein an adhesiveness enhancing layer is further included between the relief structure layer and the deposition layer. The adhesiveness enhancing layer is formed in order to enhance adhesiveness between the relief structure layer and the deposition layer. Moreover, the adhesiveness enhancing layer according to the present invention may more enhance adhesiveness than the surface treatment on a surface of a relief structure layer with embossing formed thereon by a method such as electric corona discharge or plasma treatment, and improve durability by including interlayer adhesiveness within the security film.

[32] The relief structure layer may include an uneven pattern by embossing molding, thereby implementing a hologram in a form of surface relief. The relief structure layer is formed by being coated on a first protective layer.

[33] An exemplary embodiment of the relief structure layer in the present invention may include polystyrene, polymethyl methacrylate, nitrocellulose and the like, when the first protective layer is a polyester-based compound. The molding of the relief

structure layer may be carried out using heat and pressure, or using UV curing, but not limited thereto. Further, when the relief structure layer is laminated on the first protective layer, the first protective layer may be subjected to surface activation treatment such as corona discharge treatment or plasma treatment.

- [34] The relief structure layer may have a thickness of preferably 0.3 ~ 3 μm , but not particularly limited thereto.
- [35] On the relief structure layer, an adhesiveness enhancing layer is formed. The adhesiveness enhancing layer may significantly improve interlayer adhesiveness between the relief structure layer and the deposition layer, thereby implementing an increasing effect of abrasion resistance and long-term durability of the film.
- [36] The adhesiveness enhancing layer herein may have the interlayer adhesiveness between the relief structure layer and the deposition layer of 50 to 200 gf/mm, preferably 135 gf/mm or more. Here, the interlayer adhesiveness is measured by delamination evaluation by a 180° peel method (peeling rate of 300 mm/min) using an Instron tensile tester (Instron).
- [37] It is preferred that the adhesiveness enhancing layer satisfies the above range, since abrasion resistance and adhesiveness may be increased, and long-term durability may be further improved.
- [38] The adhesiveness enhancing layer includes any one or a mixture of two or more selected from the group consisting of a urethane-based compound, an acryl-based compound and an ester-based compound.
- [39] The urethane-based compound may be a polyurethane resin. The polyurethane resin is not particularly limited, however, may be a water-soluble or water-dispersible polyurethane resin obtained by reacting a diol compound and a diisocyanate compound. As the polyurethane resin, two or more different from each other may be used.
- [40] As the diol compound, a diol compound obtained by polymerization of ethylene oxide, propylene oxide, or hetero alkylene oxide such as ether such as tetrahydrofuran may be used. As a specific example, polyether diol such as polyethylene glycol, polypropylene glycol, polytetramethylene ether glycol, or polyhexamethylene ether glycol may be used. Further, polyester diol such as polyethylene adipate, polybutylene adipate, polyneopentyl adipate, polymethylpentyl adipate, polyethylene/butylene adipate, and polyneopentyl/hexyl adipate, polycaprolactone diol, polycarbonate diol, and the like may be used, but not limited thereto.
- [41] As the isocyanate compound, aromatic diisocyanate, alicyclic diisocyanate or aliphatic diisocyanate may be used, and as a specific example, hexamethylene diisocyanate, 2,2,4-trimethyl hexamethylene diisocyanate, 2,4,4-trimethyl hexamethylene diisocyanate, hydrogenated xylene diisocyanate, 1,3-xylene diisocyanate,

1,4-xylene diisocyanate, 1,4-cyclohexane diisocyanate and 4,4-dicyclohexylmethane diisocyanate, tetramethyl diisocyanate, hexamethylene diisocyanate, methylcyclohexane diisocyanate, tolylene diisocyanate, phenylene diisocyanate, or the like may be mentioned, but not necessarily limited thereto.

- [42] As a preferred example of the polyurethane resin herein, any one or more selected from the group consisting of polyurethane, polyether polyurethane and polycarbonate polyurethane may be used, but not necessarily limited thereto. Further, the polyurethane resin may be self-emulsified type emulsion or self-stabilized emulsion, and preferably a diol having an acid group such as a carboxylic acid group or a sulfonic acid group may be used, or a polyhydroxy compound having a low molecular weight may be added. More preferably, a polyurethane resin having a carboxyl group may be used.
- [43] As the polyurethane resin herein, those compounds obtained by mixing 10 ~ 30 wt% of polyester-based polyol having a weight average molecular weight of 5000 g/mol or less, more preferably 1000 ~ 2000 g/mol, 50 ~ 70 wt% of aliphatic-based isocyanate, 5 ~ 15 wt% of a carboxyl-based surfactant, and 5 ~ 15 wt% of triethylamine, and subjecting the mixture to a urethane reaction, may be used. As the aliphatic-based isocyanate, hexamethylene diisocyanate and the like may be used. As the carboxyl-based surfactant, dimethyl propionic acid or diethyl butionic acid may be used, and preferably those compounds having an acid value of 40 ~ 45 mg KOH/g may be used.
- [44] In an exemplary embodiment, the adhesiveness enhancing layer may be formed by coating a water-dispersible polyurethane resin composition containing a polyurethane resin on the relief structure layer.
- [45] In an exemplary embodiment, the water-dispersible polyurethane resin composition may include 0.5 ~ 2.0 wt% of polyurethane resin by solid content, 0.01 ~ 0.5 wt% of a silicone-based wetting agent, and residual water.
- [46] The acrylic-based compound herein is not particularly limited, however, may be an acryl-based resin polymerized or copolymerized from a monomer mixture including an acryl-based monomer or a (meth)acrylamide-based monomer as a main component. By way of example, methyl (meth)acrylate, ethyl (meth)acrylate, butyl (meth)acrylate, glycidyl (meth)acrylate, glycidylalkyl (meth)acrylate, (meth)acrylic acid, isocyanatoalkyl (meth)acrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxypropyl acrylate, or the like may be used, but not necessarily limited thereto.
- [47] The ester-based compound herein is not particularly limited, however, a polyester resin, monoester, diester, polyol ester, and the like may be used. By way of example, as the polyester resin, polyethylene terephthalate, polyethylene naphthalate, polyethylene naphthalate, and the like may be mentioned, and as the monoester,

normal butyl oleate, 2-ethylhexyl oleate, 2-ethylhexyl stearate, 2-ethylhexyl stearate, oleic acid butoxyethyl, and the like may be mentioned. Further, as the diester, diesters of adipic acid dioctyl, adipic acid diisononyl, adipic acid diisodecyl, azelaic acid di-2-ethylhexyl, azelaic acid diisooctyl, azelaic acid isononyl, sebacic acid di-2-ethylhexyl, sebacic acid diisooctyl, sebacic acid diisononyl, dodecanoic acid-2-ethylhexyl, 3-hydroxy-2,2-dimethylpropyl 3-hydroxy-2,2-dimethylpropanoate, and the like may be mentioned. As the polyol ester, an ester consisting of neopentyl glycol and carboxylic acid having 8 to 10 carbon atoms, an ester consisting of trimethylol propane and carboxylic acid having 8 to 10 carbon atoms, and the like may be mentioned, but not limited thereto.

- [48] Further, the present invention may include an aqueous vinyl polymer which is a reaction product of one or more ethylene-based unsaturated monomers. By way of example, the ethylene-based unsaturated monomer may include styrene, isoprene, acrylic acid, methacrylic acid, itaconic acid, crotonic acid, α -methyl styrene, vinyl naphthalene, vinyl toluene, chloromethyl styrene, acrylonitrile, vinyl chloride, vinylidene chloride, vinyl acetate, butyl acrylamide, ethyl acrylamide, and the like.
- [49] Further, a coating composition may be prepared by further including a setting agent in the aqueous vinyl polymer. As the setting agent, Rhoplex SG-30, Rhoplex HG-74P, Rhoplex SG-10M, Ucar 626, Ucar 379G, Aquamac 705, Aquamac 588, or the like may be mentioned, but not necessarily limited thereto.
- [50] The adhesiveness enhancing layer herein may have a dried coating thickness of 0.5 to 10%, preferably 1 to 5% of a total thickness of the relief structure layer and the deposition layer. When the range is satisfied, an interlayer adhesive effect may be maximized, and more preferably, remaining and removal efficiency is excellent in that the deposition layer selectively remains during a process step of etching the deposition layer in some processes, when manufacturing the security film.
- [51] The deposition layer herein is formed on the adhesiveness enhancing layer. Here, the thickness of the deposition layer is not particularly limited, however, may be preferably 100 to 1,000 Å. Further, the deposition layer is not particularly limited, however, may be a metal deposition layer deposited by a metal such as aluminum, silver, gold, tin or the like, or a transparent deposition layer deposited by a transparent synthetic resin, and preferably, an aluminum deposition layer.
- [52] The base film layer herein may be formed of any one selected from the group consisting of a PET (polyethylene terephthalate) film, a PC (polycarbonate) film, a PI (polyimide) film and a PEN (polyethylene naphthalate) film, but not necessarily limited thereto. It is preferred to use the PET film.
- [53] The release layer herein is formed by using any one or more selected from the group consisting of polyurethane-based, acryl-based, cellulose-based release agents, and the

like. The polyurethane-based release agent is preferred, since it has high surface energy of 40 ~ 55 mN/m, and good adhesion with the protective layer. The polyurethane resin is not particularly limited, however, preferably has elongation at room temperature (25°C) of 100% or less. When the elongation is 100% or less, a cutting property and releasability are excellent. As the polyurethane-based resin, one selected from the group consisting of polyurethane, polyether polyurethane and polycarbonate polyurethane.

[54] The release layer consists of a polyurethane-based resin and a diluting solvent, and a release composition having a solid content of 0.5 ~ 3.0 wt% is coated, so that a coated weight after drying is 0.03 ~ 0.15 g/m². Here, the release layer is coated in a manner of gravure coating, and the diluting solvent used for adjusting the solid content is appropriately a solvent having a weight ratio of 4:6 ~ 6:4 between isopropyl alcohol and deionized water. When coating in the above manner, it is preferred that the polyurethane-based release composition has a solid content in a range of 0.5 ~ 3.0 wt%, preferably 0.8 ~ 1.5 wt%. When the content of the polyurethane used in the release layer is more than 3 wt%, a cutting property is poor so that it is impossible to be used as a stamping foil, and when the content is less than 0.5 wt%, release force is so high that the function of the release layer is not fulfilled, and thus, a transfer property becomes poor. Here, when the solid content is 3 wt%, a coated weight after drying is 0.15 g/m², and when the solid content is 0.5 wt%, a coated weight after drying is 0.03 g/m².

[55] The first and second protective layers herein are not particularly limited, however, preferably, may be formed by coating and drying a resin composition for forming a protective layer including an epoxy resin, a curing agent, and a solvent.

[56] The epoxy resin may include any one or two or more selected from the group consisting of a bisphenol A type epoxy resin, a bisphenol F type epoxy resin, a novolac type epoxy resin, a cycloaliphatic epoxy resin, a multifunctional type amine epoxy resin, a glycidylamine type epoxy resin, a dimer acid-modified epoxy resin, a rubber-modified epoxy resin, a urethane-modified epoxy resin, a brominated epoxy resin, a brominated phenoxy epoxy resin, a hydrogenated bisphenol A type epoxy resin and a polyol-modified epoxy resin.

[57] The epoxy-based resin may include any one or two or more selected from the group consisting of a bisphenol A type epoxy resin, a bisphenol F type epoxy resin, a novolac type epoxy resin, a cycloaliphatic epoxy resin, a multifunctional type amine epoxy resin, a glycidylamine type epoxy resin, a dimer acid-modified epoxy resin, a rubber-modified epoxy resin, a urethane-modified epoxy resin, a brominated epoxy resin, a brominated phenoxy epoxy resin, a hydrogenated bisphenol A type epoxy resin and a polyol-modified epoxy resin, but not limited thereto.

[58] The epoxy-based resin may be any one or more selected from the group consisting of

a saturated or unsaturated aliphatic compound, or an alicyclic compound, an aromatic compound, or a heterocyclic compound, however, preferably, an epoxy resin containing an aromatic functional group in the molecule. For example, an epoxy resin having a glycidylamine portion derived from meta-xylylenediamine, an epoxy resin having a glycidylamine portion derived from 1,3-bis(aminomethyl)cyclohexane, an epoxy resin having a glycidylamine portion derived from diaminodiphenylmethane, an epoxy resin having a glycidylamine portion and/or a glycidylether portion derived from para-aminophenol, an epoxy resin having a glycidylether portion derived from bisphenol A, an epoxy resin having a glycidylether portion derived from bisphenol F, an epoxy resin having a glycidylether portion derived from phenolnovolac, and an epoxy resin having a glycidylether portion derived from resorcinol may be used, and preferably, any one or more selected from the group consisting of an epoxy resin having a glycidylamine portion derived from metaxylylenediamine, an epoxy resin having a glycidylamine portion derived from 1,3-bis(aminomethyl)cyclohexane, an epoxy resin having a glycidylether portion derived from bisphenol F, and an epoxy resin having a glycidylether portion derived from resorcinol may be used.

- [59] Further, as the epoxy resin, a dimer acid-modified epoxy resin may be used. The dimer acid-modified epoxy resin may improve adhesion strength to improve performance of the protective layer, and express an increasing effect of mechanical physical properties such as durability, flexibility, impact resistance, thermal resistance and the like of a film. The dimer acid-modified epoxy resin may be formed by reaction of one or more carboxyl groups and a multifunctional epoxy resin in a dimer acid structure.
- [60] The curing agent may include any one or two or more amine-based curing agents selected from the group consisting of aliphatic amine, modified amine, aromatic amine, tertiary amine and polyamine-based compounds.
- [61] Preferably, the polyamine-based compound may be used. By way of example, aliphatic amines such as ethylene diamine, diethylene triamine, triethylene tetramine and tetraethylene pentamine, aliphatic amine having an aromatic ring such as metaxylylenediamine and paraxylyldiamine, alicyclic amines such as 1,3-bis(aminomethyl)cyclohexane, isophoronediamine and norbornendiamine, and aromatic amines such as diaminodiphenylmethane and metaphenylenediamine may be mentioned, but not limited thereto.
- [62] The curing agent may be contained at 70 ~ 250 parts by weight, preferably 100 ~ 250 parts by weight, more preferably 150 ~ 200 parts by weight, based on 100 parts by weight of the epoxy-based resin. When the content range is satisfied, a curing rate is good, and processability is excellent.
- [63] A resin composition for forming the protective layer may have viscosity of 1,000 ~

3,000 cP (25°C), preferably 1,500 ~ 2,500 cP (25°C).

[64] The first and second protective layers herein may have a thickness of preferably 0.1 to 10 μm , more preferably 0.5 to 2 μm .

[65] The first and second protective layers may have a thickness identical to or different from each other, and it is more preferred to have the same thickness in order to prevent deformation of the relief structure layer or other laminated components within the security film by external tension. Further, it is more preferred that the resin materials for forming the first and second protective layers are the same, in terms of dimensional stability and durability.

[66] It is preferred that at least one of the first and second protective layers herein has transparency so that the relief structure layer is visible, or the relief structure layer may be colored so as to be visible.

[67] FIG. 1 is a cross-sectional view of a security film according to an exemplary embodiment of the present invention, wherein a release layer 20, a first protective layer 30, a relief structure layer 40, an adhesiveness enhancing layer 50, a deposition layer 60, a second protective layer 70, and an adhesive layer 80 may be sequentially formed on a base film layer 10.

[68] Hereinafter, a detailed description of the present invention will be provided by way of example, however, the present invention is not limited to the following Examples.

[69] Hereinafter, physical properties were measured by the following methods:

[70] (1) Adhesiveness (unit: gf/mm)

[71] A specimen was cut at intervals of a 1 cm width, and then delamination was evaluated by a 180° peel method (peeling rate of 300 mm/min) using an Instron tensile tester, thereby measuring interlayer adhesiveness between an aluminum deposition layer and an adhesiveness enhancing layer.

[72] (2) Etching time of aluminum deposition layer (unit: sec)

[73] A sample (1cm × 10cm × 200 μm) in which an aluminum deposition layer is formed on an adhesiveness enhancing layer according to an exemplary embodiment was immersed in an alkali solution (NaOH, 1%) to measure aluminum etching time.

[74] (3) Optical density

[75] After forming the deposition layer, 10 points were selected at 5 cm intervals on the thus-prepared deposition film, and measurement was carried out using an optical density meter (Gretag Macbeth, IC Film), and an average value was calculated.

[76] (4) Durability evaluation

[77] ① Chemical durability

[78] The specimens according to Examples and Comparative Examples were immersed in components as shown in the following Table 1 at 23°C for 30 minutes, and degrees of change were indicated by classification in accordance with the following legend of

minimum requirements.

[79] ② Physical durability

[80] Tests for Abrasion resistance (ASTM D996), wrinkle resistance (performed by NBS crumpling device available as IGT), and interlayer adhesion within a film by a cross-cutter (ASTM D3359) were carried out, as shown in the following Table 1. Further, wash resistance was measured by placing a cotton warmer including the specimen in a common washing machine, and washing it using a general detergent (1 g/L) and cold water for 30 minutes. The results were indicated by classification in accordance with the following legend of minimum requirements.

[81] ③ Environmental durability

[82] Thermal resistance, cold resistance and light resistance tests were carried out under the conditions as shown in the following Table 1, and the results were indicated by classification in accordance with the following legend of minimum requirements.

[83] [Legend of minimum requirements]

[84] 5: No change (5% or less)

[85] 4: Small change (20% or less)

[86] 3: Considerable change (50% or less)

[87] 2: Significant change (50% or more)

[88] 1: Element disappeared

[89]

[90] (Example 1)

[91] A polyethylene terephthalate (PET) film having a thickness of 12 μm (Kolon, FQ00) was used as a base film. As described below, a release layer, a first protective layer, a relief structure layer, a deposition layer, a second protective layer, and an adhesive layer were sequentially coated on the base film to manufacture a security film. The physical properties of the thus-manufactured security film were measured, and are shown in Table 1.

[92] Release layer: 8.0 wt% of acryl resin (Lubrizol, RA17-1 grade, solid content 25%), 0.225 wt% of wax (Hoechst, montan OP wax, solid content 100%), and 91.775 wt% of a solvent (a weight ratio of toluene: methyl ethyl ketone: xylene being 5:3:2) were mixed, then the solution heated to 60°C was coated using 180 mesh gravure, and a coating amount after drying was 0.03 g/m² (thickness: 30 nm).

[93] First and Second protective layers: 150 parts by weight of a curing agent (Kolon Industries, Inc., KPH-F2002) was prepared relative to 100 parts by weight of an epoxy resin (Kolon Industries, Inc., KEC-2185), so as to have a solid content of 30 wt% in a MEK solvent (thickness: 0.5 μm).

[94] Relief structure layer: A relief structure layer was coated on the first protective layer, and then heat and pressure were applied thereto using an embossing machine, thereby

forming the relief structure (thickness: 2 μ m).

- [95] Adhesiveness enhancing layer: A polyurethane resin prepared by reacting 22.5 wt% of polyester-based polyol having a weight average molecular weight of 2,000 g/mol, 58.4 wt% of hexamethylene diisocyanate, 9.0 wt% of dimethylpropionic acid, and 10.1 wt% of triethylamine was used. A water-dispersible polyurethane coating composition including a solid content of 0.5 wt% of the polyurethane resin, 0.1 wt% of a silicone-based wetting agent, and residual water was coated by a gravure coating method, thereby forming an adhesiveness enhancing layer on one surface in a dried coating thickness of 35 nm (thickness: 30 nm).
- [96] Deposition layer: A 250 Å aluminum deposition layer was formed so that optical density (OD) is 2.2.
- [97] Adhesive layer: 30 wt% of CI-PP (Nippon Paper Chemicals, Superchlon 773H), 60 wt% of an acryl resin (Aekyung Chemical, A-111-50 grade), and 10 wt% of silica particles were mixed, and coated so that a coated weight after drying is 4.5 g/m² (thickness: 4.5nm).
- [98]
- [99] (Example 2)
- [100] A security film was manufactured in the same manner as in Example 1, except that the component of the adhesiveness enhancing layer was changed to an acryl-based resin. The durability of the thus-manufactured security film was measured, and is shown in Table 1. As the acryl-based resin, the compound prepared as follows, was used:
- [101] 110 parts by weight of ion exchange water, and 0.9 part by weight of sodium laurylsulfate were dissolved in a reaction vessel. In a separate high-speed stirrer, 134 parts by weight of ion exchange water, 4.7 parts by weight of sodium lauryl sulfate, 137 parts by weight of butyl acrylate, and 88 parts by weight of methyl methacrylate were added and emulsified. Then, a mixture of 2.5 parts by weight of an acrylic acid monomer, 5 parts by weight of a 2-hydroxyethyl methacrylate monomer, and 3.8 parts by weight of polyethylene glycol acrylic acid diester was emulsified and stabilized, and then added to the reaction vessel. Temperature was adjusted to 75°C, and emulsion polymerization was carried out for 4 hours, thereby obtaining acryl-based resin emulsion having a weight average molecular weight of 300,000 g/mol. Here, 0.2 part by weight of ammonia water, 0.01 part by weight of antifoaming agent (NOPCO NXZ), and 0.08 part by weight of sodium hexametaphosphate were added thereto relative to 100 parts by weight of the acryl-based resin emulsion, thereby preparing a water-dispersible acryl-based resin coating composition. The water-dispersible polyurethane coating composition including a solid content of 0.5 wt% of the polyurethane resin, 0.1 wt% of a silicone-based wetting agent, and residual water was

coated by a gravure coating method, thereby forming an adhesiveness enhancing layer on one surface in a dried coating thickness of 35 nm.

[102]

[103] (Example 3)

[104] A security film was manufactured in the same manner as in Example 1, except that the component of the adhesiveness enhancing layer is changed to an ester-based resin. The durability of the thus-manufactured security film was measured, and is shown in Table 1. The ester-based resin was coated using a coating composition (solid content 50 wt%) of diester of 3-hydroxy-2,2-dimethylpropyl 3-hydroxy-2,2-dimethylpropanoate mixed with RHOPLEX SG-30 by a gravure coating method, thereby forming an adhesiveness enhancing layer on one surface in a dried coating thickness of 35 nm.

[105]

[106] (Comparative Example 1)

[107] A security film was manufactured in the same manner as in Example 1, except that corona treatment (under a condition of running speed of the film 2 m/min, and corona 1.0 A (Ampere)) was carried out, instead of providing the adhesiveness enhancing layer on the relief structure layer. The durability of the thus-manufactured security film was measured, and is shown in Table 1.

[108]

[109] (Comparative Example 2)

[110] A security film was manufactured in the same manner as in Example 1, except that the adhesiveness enhancing layer was not provided on the relief structure layer. The durability of the thus-manufactured security film was measured, and is shown in Table 1.

[111]

[112] [Table 1]

Classification			Examp e 1	Examp e 2	Examp e 3	Comparati ve Example 1	Comparati ve Example 2
Adhesiveness enhancing layer composition			Urethan e	Acryl	Ester	Corona	No treatment
Adhesiveness (gf/mm)			167	133	85	17	15
Al etching time (sec)			90	60	45	30	15
	Item	Test method					
Chemical durability	Ethyl alcohol	23°C/30 min	4	4	3	2	2
	Acetone		4	4	2	1	1
	Acetic acid (20%)		4	4	3	1	1
	Caustic soda (2%)		4	3	2	1	1
	Bleach (5%)		3	3	2	1	1
	Artificial sweat		5	5	4	2	2
Physical durability	Abrasion resistance	Ink abrasion tester	5	5	-	-	-
	Wrinkle property	Wrinklin g 4 times	3	3	2	2	1
	Adhesion	Cross-cu tter	4	3	2	1	1

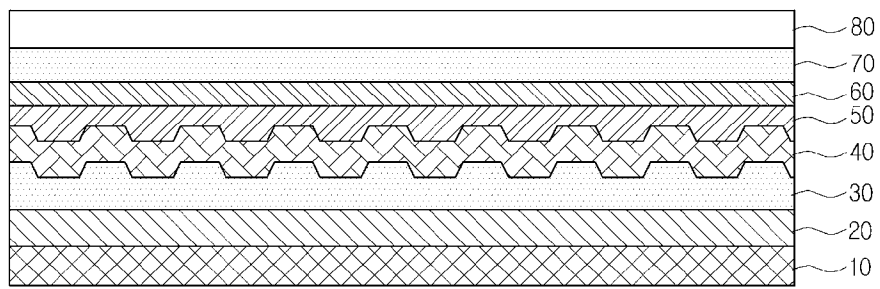
Environmental durability	Wash resistance	Washing machine/ 30 min	3	3	2	2	2
	Thermal resistance	135°C / 60min	5	4	3	2	2
	Cold resistance	-18°C/60 min	5	4	3	2	2
	Light resistance	Light resistance tester/ 60 min	4	3	3	3	3

[113]

Claims

- [Claim 1] A security film comprising a base film layer, a release layer, a first protective layer, a relief structure layer, a deposition layer, a second protective layer, and an adhesive layer which are sequentially laminated,
wherein an adhesiveness enhancing layer is further comprised between the relief structure layer and the deposition layer.
- [Claim 2] The security film of claim 1, wherein the adhesiveness enhancing layer includes any one or a mixture of two or more selected from the group consisting of a urethane-based compound, an acryl-based compound and an ester-based compound.
- [Claim 3] The security film of claim 1, wherein the release layer is formed by coating a release composition including a polyurethane-based resin and a solvent, and has a coating amount after drying of $0.03 \sim 0.15 \text{ g/m}^2$,
and
the release composition has a solid content of $0.5 \sim 3.0 \text{ wt}\%$.
- [Claim 4] The security film of claim 3, wherein the polyurethane-based resin is any one or more selected from the group consisting of polyurethane, polyether polyurethane and polycarbonate polyurethane.

[Fig. 1]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2015/014541**A. CLASSIFICATION OF SUBJECT MATTER****B32B 27/08(2006.01)i, B32B 27/30(2006.01)i, B32B 27/36(2006.01)i, B32B 27/40(2006.01)i, B32B 7/06(2006.01)i, B32B 3/30(2006.01)i**

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)

B32B 27/08; G03H 1/02; B32B 7/02; B32B 15/20; G09F 3/02; B32B 15/08; G08B 13/24; B32B 27/30; B32B 27/36; B32B 27/40; B32B 7/06; B32B 3/30

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: security film, protect layers, base film, release layer, relief structure layer, deposition layer, adhesiveness enhancing layer, polyurethane

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2011-0119890 A (JANGHAN INPLA CO., LTD.) 3 November 2011 See abstract; paragraphs [0016]-[0028]; claim 1; figure 1.	1-4
Y	KR 10-1141757 B1 (KCC CO., LTD.) 3 May 2012 See abstract; paragraphs [0021]-[0028], [0041]-[0043]; claims 1-5; figure 1.	1-4
Y	WO 00-57379 A1 (API FOILS LIMITED) 28 September 2000 See page 11, line 6-page 12, line 4; claims 1, 3, 4; figure 2.	3,4
A	KR 10-1245939 B1 (KOREA MINTING, SECURITY PRINTING & ID CARD OPERATING CORP.) 21 March 2013 See abstract; paragraphs [0009], [0010], [0012], [0032]-[0034], [0056]; claims 5, 7; figure 1.	1-4
A	JP 09-016058 A (DAINIPPON PRINTING CO., LTD.) 17 January 1997 See abstract; paragraphs [0012]-[0019]; claims 1-4; figures 1(a)-1(e).	1-4



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"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

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2015/014541

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KR 10-1245939 B1	21/03/2013	KR 10-2012-0077586 A	10/07/2012
JP 09-016058 A	17/01/1997	None	