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(54) **Bevonó réteg vakításmentes filmhez, és az ezt tartalmazó vakításmentes film**

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(54) **COATING LAYER FOR AN ANTIGLARE FILM, AND AN ANTIGLARE FILM COMPRISING THE SAME**

BESCHICHTUNGSSCHICHT FÜR EINEN BLENDSCHUTZFILM UND BLENDSCHUTZFILM DAMIT

COUCHE DE REVÊTEMENT POUR FILM ANTIREFLET ET FILM ANTIREFLET LA COMPORTANT

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Description

[Technical Field]

[0001] The present invention relates to a coating layer for an anti-glare film that can prevent glare by reflection of external light on a surface of a display and an anti-glare film comprising the same and to a composition for forming a coating layer. This application claims priority from Korean Patent Application No. 10-2010-0014931 filed on February 19, 2010 in the KIPO, the disclosure of which is incorporated herein by reference in its entirety.

[Background Art]

[0002] As consumers demand high quality products having a large monitor, high image quality, multi-functions and high performance that conform with the recent trend of high speed and high density in information transmission, and diversity and multi-functions of transmission media, a flat panel display (FPD) having a large monitor has appeared. In accordance with enlargement and slimness of displays and an increase in demand of notebook PCs, various types of flat panel displays such as LCDs, PDPs, rear-projection TVs have been developed and commercialized. However, if these displays are exposed to external light such as sunlight, a user feels fatigue in his/her eyes or a headache due to light reflecting from surfaces, and images made in displays are not clearly considered.

[0003] In order to solve the disadvantages, an anti-glare effect is implemented by forming unevenness on a surface of a display to scatter external light on the surface. However, there is a problem in that it causes distinctness-of-image to reduce in a display having high resolution. In order to improve the problem, a method for inducing internal haze by adding particles for inducing internal scattering to a coating layer is used, but has many problems.

[0004] Korean Patent No. 10-046782 discloses an anti-glare coating layer for high resolution using a first particulate having a difference in refractive index of 0.2 to 0.5 from an acrylate-based binder resin and an average diameter of 0.05 to 1 μm and a second particulate having a difference in refractive index of 0.1 or less from the acrylate-based binder resin and an average particle diameter of 0.5 to 3 μm, but there is a disadvantage in that the difference between the refractive indexes of the binder resin and the first particulate is large, such that contrast is reduced.

[0005] Meanwhile, Korean Patent No. 10-0378340 discloses an anti-glare coating layer in which at least two light transmission particulates are included in a binder resin, a difference in refractive index of the light transmission particulates to the binder is 0.03 to 0.2, and each of the light transmission particulates has different refractive index, but there are disadvantages in that an anti-glare property is low while the distinctness-of-image and haze value are the same, contrast is reduced due to a haze of 10% or more, and scratch resistance is reduced due to organic particles.

[0006] In addition, Korean Patent No. 10-0296369 discloses an anti-glare coating layer in which a light transmission diffusion agent is included in a binder resin, an external haze value by surface unevenness is 7 to 30, and an internal haze value by the light transmission diffusion agent is 1 to 15, but there is a disadvantage in that contrast is reduced due to a high surface haze value.

[0007] WO2008/140283A1 discloses a composition for an anti-glare film that includes a binder resin; and an organic particle which is included in an amount of 1 to 30 parts by weight based on 100 parts by weight of the binder resin and in which concave and convex patterns are formed on a surface thereof.

[0008] WO2008/140282A2 discloses a composition for an anti-glare film that includes a binder resin; and a core-shell particle having an average surface roughness in the range of 0 to 2 μm.

[0009] WO01127193A1 discloses a thermoplastic-resin additive for matting comprising particles of heavy calcium carbonate which have irregular polyhedral shape and have been regulated with respect to particle size and particle size distribution; and a thermoplastic resin composition containing the additive.

[Disclosure]

[Technical Problem]

[0010] In general, as a fine particle included in order to provide a light scattering effect to an anti-glare film, an organic particulate is mainly used.

[0011] However, in this case, since strength of a coating film is weak, there is a problem in that a scratch is easily formed, and if the coating film is coated in such a way that the thickness thereof is thick in order to prevent the problem, there are problems in that fine cracks are formed in the coating film in a manufacturing process of a polarizing plate of a large-sized display to increase a defective ratio and a cut surface is broken when the polarizing plate is cut because of brittleness of the binder resin.

[0012] The present invention has been made in an effort to provide an anti-glare coating composition having excellent anti-glare and scratch resistance properties and particularly excellent scratch resistance and pencil hardness as a thin

film to easily manufacture a large-sized polarizing plate and an anti-glare film for a high resolution display manufactured by using the same.

[Technical Solution]

[0013] An exemplary embodiment of the present invention provides a coating layer for an anti-glare film, comprising:

a binder resin,
organic particulates which is one or more selected from polystyrene, polymethylmethacrylate, polymethylacrylate, polyacrylate, polyacrylate-co-styrene, polymethylacrylate-co-styrene, polymethylmethacrylate-co-styrene, polycarbonate, polyvinyl chloride, polybutyleneterephthalate, polyethyleneterephthalate, polyamides, polyimides, polysulfone, polyphenylene oxide, polyacetal, epoxy resin, phenol resin, silicon resin, melamine resin, benzoguamine, polydivinylbenzene, polydivinylbenzene-co-styrene, polydivinylbenzene-co-acrylate, polydiallylphthalate and triallylisocyanurate polymer, or two or more copolymers thereof, and
inorganic particulates which is one or more selected from the group consisting of silica, silicon particle, aluminum hydroxide, magnesium hydroxide, alumina, zirconia and titania,
wherein differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less,
wherein the organic particulate has a spherical shape, and a particle diameter is in the range of 1 to 7 μm,
wherein the inorganic particulates has a spherical shape, a particle diameter is in the range of 2 to 10 μm, and
wherein the organic particulates and the inorganic particulates form a single particle layer without an overlapping phenomenon of the organic and the inorganic particulates.

[0014] An anti-glare film comprising the coating layer for the anti-glare film is also provided.

[0015] Yet another exemplary embodiment of the present invention provides a composition for forming a coating layer according to claim 1, comprising:

a binder resin,
organic particulates which is one or more selected from polystyrene, polymethylmethacrylate, polymethylacrylate, polyacrylate, polyacrylate-co-styrene, polymethylacrylate-co-styrene, polymethylmethacrylate-co-styrene, polycarbonate, polyvinyl chloride, polybutyleneterephthalate, polyethyleneterephthalate, polyamides, polyimides, polysulfone, polyphenylene oxide, polyacetal, epoxy resin, phenol resin, silicon resin, melamine resin, benzoguamine, polydivinylbenzene, polydivinylbenzene-co-styrene, polydivinylbenzene-co-acrylate, polydiallylphthalate and triallylisocyanurate polymer, or two or more copolymers thereo, and
inorganic particulates which is one or more selected from the group consisting of silica, silicon particle, aluminum hydroxide, magnesium hydroxide, alumina, zirconia and titania,
wherein differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less,
wherein the organic particulate has a spherical shape, and a particle diameter is in the range of 1 to 7 μm, and
wherein the inorganic particulates has a spherical shape, a particle diameter is in the range of 2 to 10 μm.

[0016] Provided is also a method for manufacturing an anti-glare film, comprising 1) coating a composition for an anti-glare film which comprises a binder resin, organic particulates, and inorganic particulates and in which differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less, on a substrate, and 2) curing the composition.

[0017] Preferred embodiments are disclosed in the subclaims.

[Advantageous Effects]

[0018] According to the exemplary embodiments of the present invention, a coating layer for an anti-glare film according to an exemplary embodiment of the present invention can provide an anti-glare film having excellent anti-glare property, distinctness-of-image, and contrast, such that the coating layer can be applied to a display having high resolution and has excellent scratch resistance property in terms of a coating thickness of a thin film, such that it is easy to enlarge a polarizing plate.

[Best Mode]

[0019] Hereinafter, the present invention will be described in detail.

[0020] The coating layer for an anti-glare film according to an exemplary embodiment of the present invention comprises

a binder resin,
organic particulates which is one or more selected from polystyrene, polymethylmethacrylate, polymethylacrylate, polyacrylate, polyacrylate-co-styrene, polymethylacrylate-co-styrene, polymethylmethacrylate-co-styrene, polycarbonate, polyvinyl chloride, polybutyleneterephthalate, polyethyleneterephthalate, polyamides, polyimides, polysulfone, polyphenylene oxide, polyacetal, epoxy resin, phenol resin, silicon resin, melamine resin, benzoguamine, polydivinylbenzene, polydivinylbenzene-co-styrene, polydivinylbenzene-co-acrylate, polydiallylphthalate and triallylisocyanurate polymer, or two or more copolymers thereof, and
inorganic particulates which is one or more selected from the group consisting of silica, silicon particle, aluminum hydroxide, magnesium hydroxide, alumina, zirconia and titania,
wherein differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less,
wherein the organic particulate has a spherical shape, and a particle diameter is in the range of 1 to 7 μm,
wherein the inorganic particulates has a spherical shape, a particle diameter is in the range of 2 to 10 μm, and
wherein the organic particulates and the inorganic particulates form a single particle layer without an overlapping phenomenon of the organic and the inorganic particulates.

[0021] It is preferable that the total content of the organic particulate and the inorganic particulate is in the range of 1 to 30 parts by weight on the basis of 100 parts by weight of the binder resin. That is, it is preferable that the sum of the total amount of the particulates comprising the organic particulates and the inorganic particulates is 1 to 30 parts by weight on the basis of 100 parts by weight of the binder resin. If the total content of the organic particulates and the inorganic particulates is less than 1 parts by weight on the basis of 100 parts by weight of the binder resin, a haze value by internal scattering is not sufficiently implemented, and if it is more than 30 parts by weight, since a coating property becomes poor and a haze value by internal scattering becomes excessively large, a contrast ratio is reduced, which is not preferable.

[0022] It is preferable that the content of the inorganic particulates is in the range of 20 to 80 parts by weight on the basis of 100 parts by weight of the organic particulates. If the amount of the inorganic particulates is less than 20 parts by weight on the basis of 100 parts by weight of the organic particulates, scratch resistance property is weakened by the organic particulates protruding from the surface, and if the amount is more than 80 parts by weight, the surface becomes rough and crack defects are formed on the coating surface, which are not preferable.

[0023] In the organic particulates, the difference between the average refractive indexes of the binder resin and the organic particulates is 0.3 or less and preferably 0.02 to 0.2. If the difference between the refractive indexes is less than the lower limit, it is difficult to obtain a sufficient haze value by the internal scattering, and if it is more than the upper limit, transmissivity is decreased while the haze value is increased because the internal scattering is increased, such that a contrast ratio is reduced, which is not preferable.

[0024] The organic particulate has a spherical shape, and the particle diameter is in the range of 1 to 7 μm. If the diameter is less than 1 μm, a scattering property is reduced, such that a sufficient haze value cannot be obtained, which is not preferable, and if it is more than 7 μm, the thickness of the coating film is increased, such that the film is cracked or broken, which is not preferable.

[0025] The organic particulate uses one or more selected from polystyrene, polymethylmethacrylate, polymethylacryiate, polyacrylate, polyacrylate-co-styrene, poly-methylacrylate-co-styrene, polymethylmethacrylate-co-styrene, polycarbonate, polyvinyl chloride, polybutyleneterephthalate, polyethyleneterephthalate, polyamides, polyimides, polysulfone, polyphenylene oxide, polyacetal, epoxy resin, phenol resin, silicon resin, melamine resin, benzoguamine, polydivinylbenzene, polydivinylbenzene-co-styrene, polydivinylbenzene-co-acrylate, polydiallylphthalate and triallylisocyanurate polymer, or two or more copolymers thereof.

[0026] The inorganic particulate has a spherical shape, and the particle diameter is in the range of 2 to 10 μm. If the diameter is less than 2 μm, the particle is embedded in the binder resin, such that an external haze cannot be implemented, and if it is more than 10 μm, the thickness of the coating film is increased, which is not preferable.

[0027] In the inorganic particulates, the difference between the average refractive indexes of the binder resin and the organic particulates is 0.3 or less and preferably 0.02 to 0.2. If the difference between the refractive indexes is less than the lower limit, it is difficult to obtain a sufficient haze value by the internal scattering, and if it is more than the upper limit, transmissivity is decreased while the haze value is increased because the internal scattering is increased, such that a contrast ratio is reduced, which is not preferable.

[0028] The inorganic particulate uses a single substance selected from silica, silicon particle, aluminum hydroxide,

magnesium hydroxide, alumina, zirconia, and titania, or two or more mixtures thereof.

[0029] An acryl-based binder resin may be used as the binder resin. The kind of acryl-based binder resin is not particularly limited, and if it is known in the art, it can be used without a particular limit. As examples of the acryl-based binder resin, an acrylate monomer, an acrylate oligomer, or a mixture thereof may be used. In this case, it is preferable that the acrylate monomer or the acrylate oligomer comprises at least one acrylate functional group that can participate in a curing reaction.

[0030] The kind of acrylate monomer and acrylate oligomer is not particularly limited, and the kind generally used in the art to which the present invention belongs may be used without a limit.

[0031] As the acrylate oligomer, a urethane acrylate oligomer, an epoxy acrylate oligomer, a polyester acrylate, a polyether acrylate or a mixture thereof may be used. As the acrylate monomer, dipentaerythritol hexaacrylate, dipentaerythritol hydroxy pentaacrylate, pentaerythritol tetraacrylate, pentaerythritol triacrylate, trimethylene propyl triacrylate, propoxylated glycerol triacrylate, trimethylopropane ethoxy triacrylate, 1,6-hexanedioldiacrylate, propoxylated glycero triacrylate, tripropylene glycol diacrylate, ethyleneglycol diacrylate or a mixture thereof may be preferably used, but it is not limited thereto.

[0032] In particular, the coating layer for the anti-glare film according to the exemplary embodiment of the present invention may provide an anti-glare film having excellent anti-glare property, distinctness-of-image and contrast by comprising the organic particulates and the inorganic particulates in the single coating layer together, such that the layer can be applied to a display having high resolution, and has excellent scratch resistance in the coating thickness of the thin film, such that it is easy to enlarge a polarizing plate.

[0033] In addition, since the coating layer for the anti-glare film according to the exemplary embodiment of the present invention has excellent dispersity of the organic particulates and the inorganic particulates included in the coating layer, a single particle layer without an overlapping phenomenon of the organic particulates and the inorganic particulates is formed.

[0034] The coating layer for the anti-glare film according to the exemplary embodiment of the present invention has excellent anti-glare property, distinctness-of-image, contrast, mechanical strength of the final film, and scratch resistance.

[0035] The thickness of the coating layer for the anti-glare film is preferably 1 to 20 μm and more preferably 1 to 4 μm. This is because the thinner the coating layer is, the lower the possibility of crack is. However, since the purpose of forming the coating layer is sufficiently implemented, the above thickness range may be appropriately controlled by a person with ordinary skill in the art within the above range in consideration of this purpose.

[0036] In addition, the anti-glare film comprises the coating layer for the anti-glare film.

[0037] In addition, a composition for an anti-glare film according to an exemplary embodiment of the present invention comprises

a binder resin,
organic particulates which is one or more selected from polystyrene, polymethylmethacrylate, polymethylacrylate, polyacrylate, polyacrylate-co-styrene, polymethylacrylate-co-styrene, polymethylmethacrylate-co-styrene, polycarbonate, polyvinyl chloride, polybutyleneterephthalate, polyethyleneterephthalate, polyamides, polyimides, polysulfone, polyphenylene oxide, polyacetal, epoxy resin, phenol resin, silicon resin, melamine resin, benzoguamine, polydivinylbenzene, polydivinylbenzene-co-styrene, polydivinylbenzene-co-acrylate, polydiallylphthalate and triallylisocyanurate polymer, or two or more copolymers thereo, and
inorganic particulates which is one or more selected from the group consisting of silica, silicon particle, aluminum hydroxide, magnesium hydroxide, alumina, zirconia and titania,
wherein differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less,
wherein the organic particulate has a spherical shape, and a particle diameter is in the range of 1 to 7 μm, and
wherein the inorganic particulates has a spherical shape, a particle diameter is in the range of 2 to 10 μm.

[0038] In the composition for the anti-glare film according to the exemplary embodiment of the present invention, since the description on the binder resin, the organic particulates and the inorganic particulates is the same as the above description, a detailed description thereof will be omitted.

[0039] The composition for the anti-glare film according to the exemplary embodiment of the present invention may further comprise 50 to 500 parts by weight of solvent on the basis of 100 parts by weight of the binder resin.

[0040] The kind of solvent is not particularly limited, but an organic solvent may be generally used.

[0041] It is preferable that the solvent is used in the amount of 50 to 500 parts by weight on the basis of 100 parts by weight of the binder resin. If the content of the solvent is less than 50 parts by weight, the viscosity of the coating composition is very high, such that a coating property may be poor, and if it is more than 500 parts by weight, film strength of the coating film may be reduced, such that it is difficult to manufacture a thick film.

[0042] The solvent may be a single substance selected from C_1 to C_6 lower alcohols, acetates, ketones, cellosolves,

dimethylformamide, tetrahydrofurane, propyleneglycolmonomethylether, toluene, and xylene, or a mixture thereof.

[0043] Herein, lower alcohols may be one substance selected from methanol, ethanol, isopropyl alcohol, butyl alcohol, isobutyl alcohol and diacetone alcohol, acetates may be one substance selected from methyl acetate, ethyl acetate, isopropyl acetate, butyl acetate and cellosolveacetate, and ketones may be one substance selected from methylethyltone, methylisobutylketone, acetyl acetone and acetone, but they are not limited thereto.

[0044] The composition according to the exemplary embodiment of the present invention may further comprise a UV curing initiator added for the purpose of curing through the irradiation of UV.

[0045] The UV curing initiator may be a single substance selected from 1-hydroxy cyclohexylphenyl ketone, benzyl dimethyl ketal, hydroxydimethylacetophenon, benzoin, benzoin methyl ether, benzoin ethyl ether, benzoin isopropyl ether, and benzoin butyl ether, or a mixture of two or more, but is not limited thereto.

[0046] It is preferable that the UV curing initiator is added in the amount of 0.1 to 10 parts by weight on the basis of 100 parts by weight of the binder resin. If it is less than 0.1 parts by weight, a sufficient curing may not occur, and if it is more than 10 parts by weight, film strength of the anti-glare film may be reduced.

[0047] The composition for the anti-glare film according to the exemplary embodiment of the present invention may further comprise one or more additives selected from a leveling agent, a wetting agent, and an antifoaming agent.

[0048] The additive may be added in the amount of 0.01 to 10 parts by weight on the basis of 100 parts by weight of the binder resin.

[0049] The leveling agent may make the surface of the coated film coated by using the composition for the anti-glare film according to the exemplary embodiment of the present invention uniform.

[0050] Since the wetting agent reduces surface energy of the composition for the anti-glare film according to the exemplary embodiment of the present invention, when the composition for the anti-glare film is coated on a transparent substrate layer, uniform coating may be possible.

[0051] The antifoaming agent may be added to remove bubbles in the composition for the anti-glare film according to the exemplary embodiment of the present invention.

[0052] In addition, the method for manufacturing the anti-glare film comprises 1) coating a composition for an anti-glare film which comprises a binder resin, organic particulates, and inorganic particulates and in which differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less, on a substrate, and 2) curing the composition.

[0053] In the method for manufacturing the anti-glare film, the configuration of the substrate of step 1) is not particularly limited, and the kind generally used in the art to which the present invention belongs may be used.

[0054] For example, it may be formed of a substance selected from triacetylcellulose (TAC), polyethyleneterephthalate (PET), polyethylenenaphthalate (PEN), polycarbonate (PC) and norbonen-based polymer. However, this is not limited thereto, and another substance generally used in the art to which the present invention belongs may be used.

[0055] Herein, if the anti-glare film is applied to a polarizing plate for a display having high resolution, it is preferable that the substrate comprises triacetylcellulose.

[0056] The transmissivity of the substrate may be at least 85%, the haze value may be 1% or less, and the thickness may be 30 to 120 μm, but they are not limited thereto.

[0057] In the method for manufacturing the anti-glare film, the coating method of the composition for the anti-glare film of step 1) may be a wet coating method, and examples thereof may comprise a roll coating method, a bar coating method, a spray coating method, a dip coating method, and a spin coating method. The coating method is not limited thereto, and various other coating methods used in the art may be used.

[0058] In the method for manufacturing the anti-glare film, step 2) may be performed in two steps of a drying step and a curing step, or in one step. Herein, the curing step is appropriately performed by using UV.

[0059] The curing condition slightly changes depending on a mixing ratio or a component, but in general, in the case of curing by an electronic beam or UV, it is preferable that the curing is performed in the intensity of 200 to 1,000 mJ/cm^2 for 1 sec to 10 min.

[0060] In the curing by the electronic beam or UV, if the curing time is less than 1 sec, the binder resin is not sufficiently cured, such that mechanical properties such as wear resistance may be poor, and if the curing time is more than 10 min, yellowing may be formed on the transparent substrate layer.

[0061] It is apparent that the anti-glare film may further comprise a separate layer for another purpose in addition to the substrate layer and coating layer.

[0062] For example, a contamination prevention layer for preventing contamination on the surface of the display may be further included, and layers for various purposes may be further provided without a limit.

[0063] The anti-glare film may be used for preventing glare by inserting the film to a front side of a flat display having high resolution, and may be applied while not being limited to the kind of display. The display may have a structure known in the art with the exception of the aforementioned anti-glare coating film. The anti-glare coating film may be disposed at the outermost part of the display watched by an observer.

[Mode for Invention]

[0064] Hereinafter, the present invention will be described in detail through Examples.

[0065] Examples according to an exemplary embodiment of the present invention are set forth to explain the invention in more detail, many modifications thereof may be possible in addition to the following Examples, and the scope of the present invention is not limited to the following Examples.

<Example>

<Example 1>

[0066] The composition for manufacturing the anti-glare film was manufactured by uniformly mixing 10 g of urethane acrylate oligomer as the binder resin, 20 g of dipentaerythritol hexaacrylate (DPHA) as the polyfunctional acrylate monomer; 2 g of polyacrylate-co-styrene particle having the average particle diameter of 3.5 μm and the refractive index of 1.59 as the organic particulate; 2 g of silicon particle having the average particle diameter of 4 μm and the refractive index of 1.43 as the inorganic particulate; 30 g of methylethylketone and 30 g of toluene as the organic solvent; and 2 g of UV curing initiator with each other. Herein, the refractive index of the binder resin is about 1.51 to 1.53.

[0067] The film was obtained by coating the liquid composition for manufacturing the anti-glare film manufactured by the above method on the transparent substrate layer (thickness 80 μm) formed of triacetylcellulose by using the roll coating so that the dry thickness was 4 μm, and curing the composition by irradiating UV of 280 mJ/cm^2.

<Example 2>

[0068] The anti-glare film was manufactured by manufacturing the composition for manufacturing the anti-glare film in the same manner as Example 1, except that the silicon particle having the average particle diameter of 5 μm and the refractive index of 1.46 was used as the inorganic particulate, and curing the composition by using the same as Example 1.

<Comparative Example 1>

[0069] The anti-glare film was manufactured in the same manner as Example 1, except that 4 g of polyacrylate-co-styrene particle having the average particle diameter of 3.5 μm and the refractive index of 1.59 was used as the organic particulate and the inorganic particulate was not used.

<Comparative Example 2>

[0070] The anti-glare film was manufactured in the same manner as Example 1, except that 4 g of polyacrylate-co-styrene particle having the average particle diameter of 3.5 μm and the refractive index of 1.59 was used as the organic particulate, the inorganic particulate was not used, and the composition was coated so that the dry thickness of the manufactured composition was 10 μm.

<Comparative Example 3>

[0071] After the composition for manufacturing the anti-glare film was manufactured in the same manner as Example 1, except that 3.5 g of polyacrylate-co-styrene particle having the average particle diameter of 3.5 μm and the refractive index of 1.59 was used as the organic particulate and 0.5 g of the silicon particle having the average particle diameter of 4 μm and the refractive index of 1.43 was used as the inorganic particulate, the anti-glare film was manufactured by using the composition.

Experimental Example>

[0072] The physical properties of the anti-glare film manufactured according to Examples 1 to 2 and Comparative Examples 1 to 3 were measured under the following conditions, and the results are described in the following Table 1.

A. Transmissivity (%)

[0073] The transmissivity was measured by using HR-100 manufactured by Murakami Color Research Laboratory Co., Ltd.

B. Haze value (%)

[0074] The haze value was measured by using HR-100 manufactured by Murakami Color Research Laboratory Co., Ltd.

C. 60° reflection brilliance (Gloss)

[0075] The 60° reflection brilliance (Gloss) was measured by using the micro-TRI-gloss manufactured by BYK Gardner Co., Ltd.

D. Distinctness-of-image (%)

[0076] The distinctness-of-image was measured by using ICM-1T manufactured by Suga Test Instrument Co., Ltd.

E. Scratch resistance

[0077] After steel cotton wool (#0000) was bound with the hammer of 1 kg and rubbed against the anti-glare film ten times, the scratch resistance was observed.

◎ : number of scratch : 0
○ : number of scratch : 5 or less thin scratches having the size of 1 cm or less
Δ : number of scratch : more than 5 thin scratches having the size of 1 cm or less or one to three long scratches having the size of 1 cm or more
× : number of scratch : more than 3 long scratches having the size of 1 cm or more

F. Pencil hardness

[0078] The test was performed three times for each pencil hardness in the load of 500 g to measure the hardness on the basis of ASTM D3363.

G. Crack resistance

[0079] The length of crack was observed through the Mandrel test (1.0 mm).

[TABLE 1]

Classification	Example 1	Example 2	Comparative Example 1	Comparative Example 2	Comparative Example 3
Transmissivit y(%)	93.6	93.3	93.6	94.1	92.6
Haze value (%)	9.8	10.2	11.5	11	10.0
60° brilliance	68	66	68	85	70
Distinctness-of-image (%)	250	230	250	300	245
Scratch resistance	◎	◎	×	○	Δ
Pencil hardness (500g load)	3H	3H	2H	3H	2H
crack resistance	2.5 cm	2.5 cm	2.5 cm	5.0 cm	2.5 cm

[0080] As a result of the test, as shown in Table 1, it can be seen that in the case of Examples 1 and 2 formed of the organic particulates and the inorganic particulates, an anti-glare property, distinctness-of-image, pencil hardness, and crack resistance are excellent.

[0081] On the other hand, in the case of Comparative Example 1 using only the organic particulates, it can be seen that scratch resistance is reduced, and in the case of in the case of Comparative Example 2 in which only the organic particulates are used and the dry thickness is increased, it can be seen that scratch resistance is slightly improved but crack resistance is reduced. In addition, in the case of Comparative Example 3 in which the inorganic particulates are not sufficiently included as compared to the content of the organic particulates unlike Examples 1 and 2, it can be seen

that scratch resistance is reduced.

Claims

1. A coating layer for an anti-glare film, comprising:

   a binder resin,
   organic particulates which is one or more selected from polystyrene, polymethylmethacrylate, polymethylacrylate, polyacrylate, polyacrylate-co-styrene, polymethylacrylate-co-styrene, polymethylmethacrylate-co-styrene, polycarbonate, polyvinyl chloride, polybutyleneterephthalate, polyethyleneterephthalate, polyamides, polyimides, polysulfone, polyphenylene oxide, polyacetal, epoxy resin, phenol resin, silicon resin, melamine resin, benzoguamine, polydivinylbenzene, polydivinylbenzene-co-styrene, polydivinylbenzene-co-acrylate, polydiallylphthalate and triallylisocyanurate polymer, or two or more copolymers thereof, and
   inorganic particulates which is one or more selected from the group consisting of silica, silicon particle, aluminum hydroxide, magnesium hydroxide, alumina, zirconia and titania,
   wherein differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less,
   wherein the organic particulate has a spherical shape, and a particle diameter is in the range of 1 to 7 μm,
   wherein the inorganic particulates has a spherical shape, a particle diameter is in the range of 2 to 10 μm, and
   wherein the organic particulates and the inorganic particulates form a single particle layer without an overlapping phenomenon of the organic and the inorganic particulates.

2. The coating layer for an anti-glare film according to claim 1, wherein the total content of the organic particulates and the inorganic particulates is in the range of 1 to 30 parts by weight on the basis of 100 parts by weight of the binder resin.

3. The coating layer for an anti-glare film according to claim 1, wherein the content of the inorganic particulates is in the range of 20 to 80 parts by weight on the basis of 100 parts by weight of the organic particulates.

4. The coating layer for an anti-glare film according to claim 1, wherein the binder resin is an acryl-based binder resin.

5. The coating layer for an anti-glare film according to claim 4, wherein the acryl-based binder resin comprises one or more selected from the group consisting of an acrylate monomer and an acrylate oligomer.

6. The coating layer for an anti-glare film according to claim 1, wherein a thickness of the coating layer for the anti-glare film is in the range of 1 to 20 μm.

7. An anti-glare film comprising the coating layer for the anti-glare film according to any one of claims 1 to 5.

8. A composition for forming a coating layer according to claim 1, comprising:

   a binder resin,
   organic particulates which is one or more selected from polystyrene, polymethylmethacrylate, polymethylacrylate, polyacrylate, polyacrylate-co-styrene, polymethylacrylate-co-styrene, polymethylmethacrylate-co-styrene, polycarbonate, polyvinyl chloride, polybutyleneterephthalate, polyethyleneterephthalate, polyamides, polyimides, polysulfone, polyphenylene oxide, polyacetal, epoxy resin, phenol resin, silicon resin, melamine resin, benzoguamine, polydivinylbenzene, polydivinylbenzene-co-styrene, polydivinylbenzene-co-acrylate, polydiallylphthalate and triallylisocyanurate polymer, or two or more copolymers thereo, and
   inorganic particulates which is one or more selected from the group consisting of silica, silicon particle, aluminum hydroxide, magnesium hydroxide, alumina, zirconia and titania,
   wherein differences between refractive indexes of the binder resin and the organic particulates and between refractive indexes of the binder resin and inorganic particulates are each 0.3 or less,
   wherein the organic particulate has a spherical shape, and a particle diameter is in the range of 1 to 7 μm, and
   wherein the inorganic particulates has a spherical shape, a particle diameter is in the range of 2 to 10 μm.

9. The composition for an anti-glare film according to claim 8, further comprising 50 to 500 parts by weight of solvent on the basis of 100 parts by weight of the binder resin.

10. The composition for an anti-glare film according to claim 8, further comprising a UV curing initiator.

11. The composition for an anti-glare film according to claim 10, wherein the content of the UV curing initiator is 0.1 to 10 parts by weight on the basis of 100 parts by weight of the binder resin.

12. The composition for an anti-glare film according to claim 8, further comprising one or more selected from the group consisting of a leveling agent, a wetting agent and an antifoaming agent.

13. A method for manufacturing an anti-glare film, comprising:

1) coating the composition according to claim 8 on a substrate, and
2) curing the composition.

Patentansprüche

1. Beschichtungsschicht für einen Blendschutzfilm, welche umfasst:

ein Binderharz,
organische Partikel, die eines oder mehrere sind, ausgewählt aus Polystyrol, Polymethylmethacrylat, Polymethylacrylat, Polyacrylat, Polyacrylat-co-Styrol, Polymethylacrylat-co-Styrol, Polymethylmethacrylat-co-Styrol, Polycarbonat, Polyvinylchlorid, Polybutylenterephthalat, Polyethylenterephthalat, Polyamide, Polyimide, Polysulfon, Polyphenylenoxid, Polyacetal, Epoxyharz, Phenolharz, Silikonharz, Melaminharz, Benzoguamin, Polydivinylbenzol, Polydivinylbenzol-co-Styrol, Polydivinylbenzol-co-Acrylat, Polydiallylphthalat und Triallylisocyanuratpolymer, oder zwei oder mehrere Copolymere derselben, und
anorganische Partikel, die eines oder mehrere sind, ausgewählt aus der Gruppe bestehend aus Silica, Siliciumteilchen, Aluminiumhydroxid, Magnesiumhydroxid, Aluminiumoxid, Zirkoniumoxid und Titanoxid,
wobei Unterschiede zwischen Brechungsindizes des Binderharzes und der organischen Partikel und zwischen Brechungsindizes des Binderharzes und der anorganischen Partikel jeweils 0,3 oder weniger sind,
wobei die organischen Partikel eine Kugelform aufweisen und ein Teilchendurchmesser im Bereich von 1 bis 7 μm ist,
wobei die anorganischen Partikel eine Kugelform aufweisen und ein Teilchendurchmesser in dem Bereich von 2 bis 10 μm ist, und
wobei die organischen Partikel und die anorganischen Partikel eine einzelne Partikelschicht ohne ein Überlappungsphänomen der organischen und der anorganischen Partikel bilden.

2. Beschichtungsschicht für einen Blendschutzfilm nach Anspruch 1, wobei der Gesamtgehalt der organischen Partikel und der anorganischen Partikel in dem Bereich von 1 bis 30 Gewichtsteilen auf der Basis von 100 Gewichtsteilen des Binderharzes ist.

3. Beschichtungsschicht für einen Blendschutzfilm nach Anspruch 1, wobei der Gehalt der anorganischen Partikel im Bereich von 20 bis 80 Gewichtsteilen auf der Basis von 100 Gewichtsteilen der organischen Partikel ist.

4. Beschichtungsschicht für einen Blendschutzfilm nach Anspruch 1, wobei das Binderharz ein Binderharz auf Acrylbasis ist.

5. Beschichtungsschicht für einen Blendschutzfilm nach Anspruch 4, wobei das Binderharz auf Acrylbasis eines oder mehrere ausgewählt aus der Gruppe bestehend aus einem Acrylatmonomer und einem Acrylatoligomer umfasst.

6. Beschichtungsschicht für einen Blendschutzfilm nach Anspruch 1, wobei eine Dicke der Beschichtungsschicht für den Blendschutzfilm in dem Bereich von 1 bis 20 μm ist.

7. Blendschutzfilm umfassend die Beschichtungsschicht für den Blendschutzfilm nach einem der Ansprüche 1 bis 5.

8. Zusammensetzung zum Bilden einer Beschichtungsschicht nach Anspruch 1, welche umfasst:

ein Binderharz,
organische Partikel, die eines oder mehrere sind, ausgewählt aus Polystyrol, Polymethylmethacrylat, Polyme-

thylacrylat, Polyacrylat, Polyacrylat-co-Styrol, Polymethylacrylat-co-Styrol, Polymethylmethacrylat-co-Styrol, Polycarbonat, Polyvinylchlorid, Polybutylenterephthalat, Polyethylenterephthalat, Polyamide, Polyimide, Polysulfon, Polyphenylenoxid, Polyacetal, Epoxyharz, Phenolharz, Silikonharz, Melaminharz, Benzoguamin, Polydivinylbenzol, Polydivinylbenzol-co-Styrol, Polydivinylbenzol-co-Acrylat, Polydiallylphthalat und Triallylisocyanuratpolymer, oder zwei oder mehrere Copolymere derselben, und
anorganische Partikel, die eines oder mehrere sind ausgewählt aus der Gruppe bestehend aus Silica, Siliciumteilchen, Aluminiumhydroxid, Magnesiumhydroxid, Aluminiumoxid, Zirconiumoxid und Titanoxid,
wobei Unterschiede zwischen Brechungsindizes des Binderharzes und der organischen Partikel und zwischen Brechungsindizes des Binderharzes und der anorganischen Partikel jeweils 0,3 oder kleiner sind,
wobei die organischen Partikel eine Kugelform aufweisen und ein Teilchendurchmesser in dem Bereich von 1 bis 7 μm ist, und
wobei die anorganischen Partikel eine Kugelform aufweisen und ein Teilchendurchmesser in dem Bereich von 2 bis 10 μm ist.

9. Zusammensetzung für einen Blendschutzfilm nach Anspruch 8, weiter umfassend 50 bis 500 Gewichtsteile eines Lösungsmittels auf der Basis von 100 Gewichtsteilen des Binderharzes.

10. Zusammensetzung für einen Blendschutzfilm nach Anspruch 8, weiter umfassend einen UV-Härtungsinitiator.

11. Zusammensetzung für einen Blendschutzfilm nach Anspruch 10, wobei der Gehalt des UV-Härtungsinitiators 0,1 bis 10 Gewichtsteile auf der Basis von 100 Gewichtsteilen des Binderharzes ist.

12. Zusammensetzung für einen Blendschutzfilm nach Anspruch 8, weiter umfassend eines oder mehrere ausgewählt aus der Gruppe bestehend aus einem Nivellierungsmittel, einem Benetzungsmittel und einem Antischäumungsmittel.

13. Verfahren zum Herstellen eines Blendschutzfilms, umfassend:

1) Beschichten der Zusammensetzung nach Anspruch 8 auf einem Substrat und
2) Härten der Zusammensetzung.

Revendications

1. Couche de revêtement pour film antireflet, comprenant :

une résine liante,
des matières particulaires organiques dont une ou plusieurs sont sélectionnées parmi polystyrène, polyméthylméthacrylate, polyméthyacrylate, polyacrylate, polyacrylate-costyrène, polyméthylacrylate-co-styrène, polyméthylméthacrylate-co-styrène, polycarbonate, chlorure de polyvinyle, polybutylènetéréphtalate, polyéthylènetéréphtalate, polyamides, polyimides, polysulfone, oxyde de polyphénylène, polyacétal, résine époxy, résine phénolique, résine de silicone, résine de mélamine, benzoguamine, polydivinylbenzène, polydivinylbenzène-co-styrène, polydivinylbenzène-co-acrylate, polymère de polydiallylphtalate et de triallylisocyanurate ou deux ou plusieurs copolymères de ceux-ci, et
des matières particulaires inorganiques dont l'une ou plusieurs sont sélectionnées parmi le groupe constitué de silice, de particules de silicium, d'hydroxyde d'aluminium, d'hydroxyde de magnésium, d'alumine, de zircone et de titane.
dans laquelle les différences entre les indices de réfraction de la résine liante et des matières particulaires organiques et entre les indices de réfraction de la résine liante et des matières particulaires inorganiques sont chacune de 0,3 ou moindres,
dans laquelle les matières particulaires organiques ont une forme sphérique et un diamètre particulaire se situant dans la plage de 1 à 7 μm,
dans laquelle les matières particulaires inorganiques ont une forme sphérique et un diamètre particulaire se situant dans la plage de 2 à 10 μm, et
dans laquelle les matières particulaires organiques et les matières particulaires inorganiques forment une couche de particules unique sans phénomène de superposition des matières particulaires organiques et inorganiques.

2. Couche de revêtement pour film antireflet selon la revendication 1, dans laquelle la teneur totale en matières

particulaires organiques et en matières particulaires inorganiques se situe dans la plage de 1 à 30 parties en poids par rapport à 100 parties en poids de la résine liante.

3. Couche de revêtement pour film antireflet selon la revendication 1, dans laquelle la teneur en matières particulaires inorganiques se situe dans la plage de 20 à 80 parties en poids par rapport à 100 parties en poids des matières particulaires organiques.

4. Couche de revêtement pour film antireflet selon la revendication1, dans laquelle la résine liante est une résine liante à base acrylique.

5. Couche de revêtement pour film antireflet selon la revendication 4, dans laquelle la résine liante à base acrylique comprend un ou plusieurs composants sélectionnés dans le groupe constitué d'un monomère d'acrylate et d'un olygomère d'acrylate.

6. Couche de revêtement pour film antireflet selon la revendication 1, dans laquelle une épaisseur de la couche de revêtement du film antireflet se situe dans la plage de 1 à 20 μm.

7. Film antireflet comprenant la couche de revêtement pour le film antireflet selon l'une quelconque des revendications 1 à 5.

8. Composition servant à produire une couche de revêtement selon la revendication 1, comprenant :

une résine liante,
des matières particulaires organiques dont l'une ou plusieurs sont sélectionnées parmi polystyrène, polyméthylméthacrylate, polyméthyacrylate, polyacrylate, polyacrylate-co-styrène, polyméthylacrylate-co-styrène, polyméthylméthacrylate-co-styrène, polycarbonate, chlorure de polyvinyle, polybutylènetéréphtalate, polyéthylènetéréphtalate, polyamides, polyimides, polysulfone, oxyde de polyphénylène, polyacétal, résine époxy, résine phénolique, résine de silicone, résine de mélamine, benzoguamine, polydivinylbenzène, polydivinylbenzène-co-styrène, polydivinylbenzène-co-acrylate, polymère de polydiallylphtalate et de triallylisocyanurate ou deux ou plusieurs copolymères de ceux-ci, et
des matières particulaires inorganiques dont l'une ou plusieurs sont sélectionnées dans le groupe constitué de silice, de particules de silicium, d'hydroxyde d'aluminium, d'hydroxyde de magnésium, d'alumine, de zircone et de titane,
dans laquelle les différences entre les indices de réfraction de la résine liante et des matières particulaires organiques et entre les indices de réfraction de la résine liante et des matières particulaires inorganiques sont chacune de 0,3 ou moindres,
dans laquelle les matières particulaires organiques ont une forme sphérique et un diamètre particulaire se situant dans la plage de 1 à 7 μm,
dans laquelle les matières particulaires inorganiques ont une forme sphérique et un diamètre particulaire se situant dans la plage de 2 à 10 μm, et

9. Composition pour film antireflet selon la revendication 8, comprenant en outre 50 à 500 parties en poids de solvant par rapport à 100 parties en poids de la résine liante.

10. Composition pour film antireflet selon la revendication 8, comprenant en outre un suscepteur de durcissement aux UV.

11. Composition pour film antireflet selon la revendication 10, dans laquelle la teneur en suscepteur de durcissement aux UV est de 0,1 à 10 parties en poids par rapport à 100 parties en poids de la résine liante.

12. Composition pour film antireflet selon la revendication 8, comprenant en outre un ou plusieurs composants sélectionnés dans le groupe constitué d'un agent nivelant, d'un agent mouillant et d'un agent antimousse.

13. Procédé de fabrication d'un film antireflet, comprenant les étapes consistant à :

1) revêtir la composition selon la revendication 8 sur un substrat, et
2) durcir la composition

REFERENCES CITED IN THE DESCRIPTION

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EP2537886

BEVONÓ RÉTEG VAKÍTÁSMENTES FILMHEZ, ÉS AZ EZT TARTALMAZÓ VAKÍTÁSMENTES FILM

SZABADALMI IGÉNYPONTOK

1. Bevonó réteg vakításmentes filmhez (anti-glare film), amely a következőket tartalmazza:

- kötő gyanta;
- szerves részecskék, amelyekből egy vagy több választható ki a következők közül: polisztirol, polimetilmetakrilát, polimetilakrilát, poliakrilát, poliakrilát-ko-sztirol, polimetilakrilát-ko-sztirol, polimetilmetakrilát-ko-sztirol, polikarbonát, polivinilklorid, polibutiléntereftalát, polietiléntereftalát, poliamidok, polimidek, poliszulfon, polifenilén-oxid, poliacetál, epoxigyanta, fenolgyanta, szilikongyanta, melamingyanta, benzoguanin, polidivinilbenzol, polidivinilbenzol-ko-sztirol, polidivinilbenzol-ko-akrilát, polidiallilftalát, és trialillizocianurát polimer, vagy ezekből kettőnek vagy többnek kopolimerje; és
- szervetlen részecskék, amelyekből egy vagy több választható ki a következők közül: szilícium-dioxid, szilícium részecske (silicon particle), alumínium-hidroxid, magnézium-hidroxid, alumínium-oxid, cirkónium(IV)-oxid és titán-dioxid;

ahol a különbségek a kötő gyanta és a szerves részecskék törésmutatói (refractive index) és a kötő gyanta és a szervetlen részecskék törésmutatói között mindkét esetben 0,3 vagy kevesebb;
ahol a szerves részecskéknek gömbalakja van, és egy részecske átmérője az 1 μm és 7 μm közti tartományban van;
ahol a szervetlen részecskéknek gömbalakja van, és egy részecske átmérője a 2 μm és 10 μm közti tartományban van; és
ahol a szerves részecskék és a szervetlen részecskék egyetlen részecskeréteget képeznek a szerves részecskék és szervetlen részecskék átfedési tünete nélkül.

2. Az 1. igénypont szerinti bevonó réteg vakításmentes filmhez, ahol a szerves részecskék és a szervetlen részecskék együttes tartalma az 1 tömegrész és a 30 tömegrész közötti tartományban van, ahol az alapot 100 tömegrész kötő gyanta képezi.

3. Az 1. igénypont szerinti bevonó réteg vakításmentes filmhez, ahol a szervetlen részecskék tartalma a 20 tömegrész és a 80 tömegrész közötti tartományban van, ahol az alapot 100 tömegrész szerves részecske képezi.

4. Az 1. igénypont szerinti bevonó réteg vakításmentes filmhez, ahol a kötő gyanta akril-alapú kötő gyanta.

5. A 4. igénypont szerinti bevonó réteg vakításmentes filmhez, ahol az akril-alapú kötő gyanta tartalmaz egy vagy több további anyagot a következők közül kiválasztva: akrilát monomer és akrilát oligomer.

6. Az 1. igénypont szerinti bevonó réteg vakításmentes filmhez, ahol a bevonó réeg vastagsága a vakításmentes filmhez az 1 μm és 20 μm közti tartományban van.

7. Vakításmentes film, amely az 1-5. igénypontok bármelyike szerinti bevonó réteget tartalmazza a vakításmentes filmhez.

8. Kompozició egy 1. igénypont szerinti bevonó réteg kialakítására, amely a következőket tartalmazza:

- kötő gyanta;
- szerves részecskék, amelyekből egy vagy több választható ki a következők közül: polisztirol, polimetilmetakrilát, polimetilakrilát, poliakrilát, poliakrilát-ko-sztirol, polimetilakrilát-ko-sztirol, polimetilmetakrilát-ko-sztirol, polikarbonát, polivinilklorid, polibutilén-tereftalát, polietilén-tereftalát, poliamidok, poliimidek, poliszulfon, polifenilén-oxid, poliacetál, epoxigyanta, fenolgyanta, szilikongyanta, melamingyanta, benzoguamin, polidivinilbenzol, polidivinilbenzol-ko-sztirol, polidivinilbenzol-ko-akrilát, polidiallilftalát, és triallilizocianurát polimer, vagy ezekből kettőnek vagy többnek kopolimerje; és
- szervetlen részecskék, amelyekből egy vagy több választható ki a következők közül: szilícium-dioxid, szilicium részecske (silicon particle), alumínium-hidroxid, magnézium-hidroxid, alumínium-oxid, cirkónium(IV)-oxid és titán-dioxid;

ahol a különbségek a kötő gyanta és a szerves részecskék törésmutatói (refractive index) és a kötő gyanta és a szervetlen részecskék törésmutatói között mindkét esetben 0,3 vagy kevesebb;

ahol a szerves részecskéknek gömbalakja van, és egy részecske átmérője az 1 µm és 7 µm közti tartományban van;

ahol a szervetlen részecskéknek gömbalakja van, és egy részecske átmérője a 2 µm és 10 µm közti tartományban van.

9. A 8. igénypont szerinti kompozíció vakításmentes filmhez, amely tartalmaz továbbá oldószert 50 tömegrész és 500 tömegrész közötti tartományban, ahol az alapot 100 tömegrész kötő gyanta képezi.

10. A 8. igénypont szerinti kompozíció vakításmentes filmhez, amely tartalmaz továbbá UV kikeményítő (vulkanizáló) beindítót (UV curing initiator).

11. A 10. igénypont szerinti kompozíció vakításmentes filmhez, ahol az UV kikeményítő beindító tartalom a 0,1 tömegrész és a 10 tömegrész közötti tartományban van, ahol az alapot 100 tömegrész kötő gyanta képezi.

12. A 8. igénypont szerinti kompozíció vakításmentes filmhez, amely tartalmaz további a következők közül kiválasztható szereket: szintező szer (levelling agent), nedvesítő szer (wetting agent) és habzásgátló szer (antifoaming agent).

13. Eljárás vakításmentes film gyártására, amely eljárás a következő lépéseket tartalmazza:

a) felviszünk egy 8. igénypont szerinti kompozíciót egy hordozó felületre (szubsztrátumra); és
b) kikeményítjük a kompozíciót.