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(19) **United States**(12) **Patent Application Publication****Song et al.**(10) **Pub. No.: US 2006/0144713 A1**(43) **Pub. Date: Jul. 6, 2006**(54) **OPTICAL FILTER FOR IMAGE DISPLAY DEVICES AND MANUFACTURING METHOD THEREOF**(75) Inventors: **Ki Yong Song**, Seoul (KR); **Jin Young Kim**, Suwon-si (KR); **Chang Ho Noh**, Suwon-si (KR); **Sung Hen Cho**, Seoul (KR); **Euk Che Hwang**, Osan-si (KR); **Ho Chul Lee**, Suwon-si (KR)

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ALEXANDRIA, VA 22313-1404 (US)**(73) Assignee: **Samsung Corning Co., Ltd.**, Suwon-si (KR)(21) Appl. No.: **11/283,902**(22) Filed: **Nov. 22, 2005**(30) **Foreign Application Priority Data**

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C25D 5/02 (2006.01)(52) **U.S. Cl.** **205/118**(57) **ABSTRACT**

An optical filter that may include a transparent substrate, a photocatalytic film formed on the back surface of the transparent substrate, a metal pattern formed by selectively exposing the photocatalytic film to light and growing a metal crystal thereon by plating, and a near-infrared ray shielding and photoselective absorbing layer formed on the metal pattern. Since the optical filter may exhibit superior color reproduction and excellent shielding performance against electromagnetic waves, near-infrared rays and neon light, it may be applied to a variety of image display devices, e.g., PDPs.

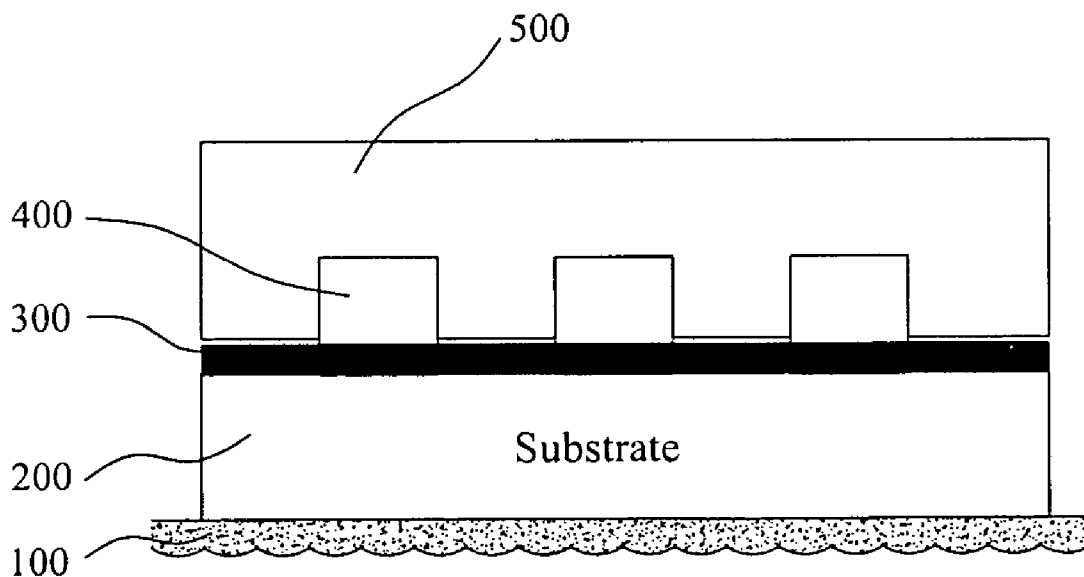


Fig. 1

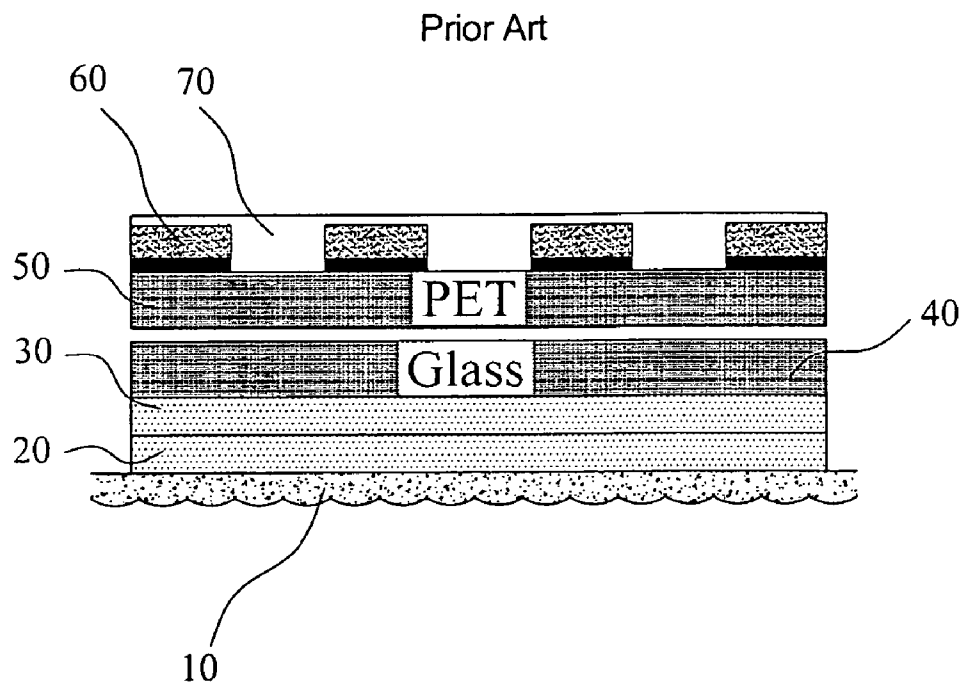


Fig. 2

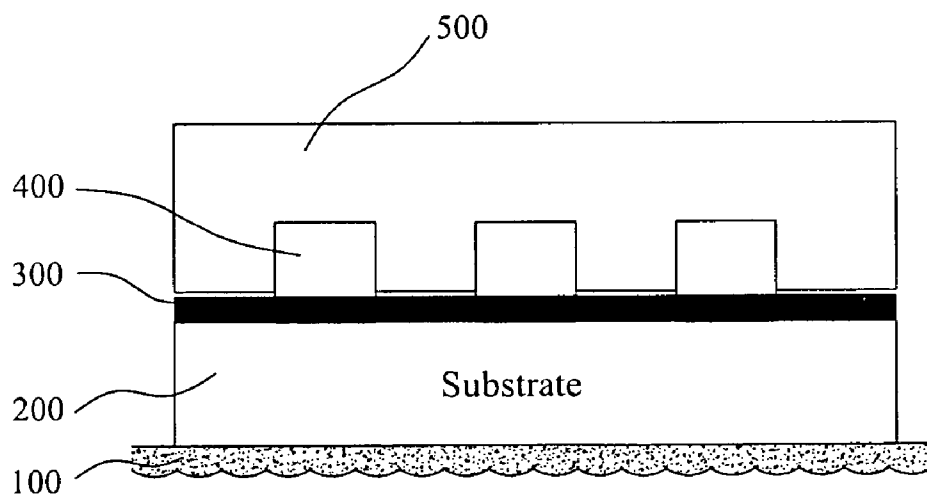
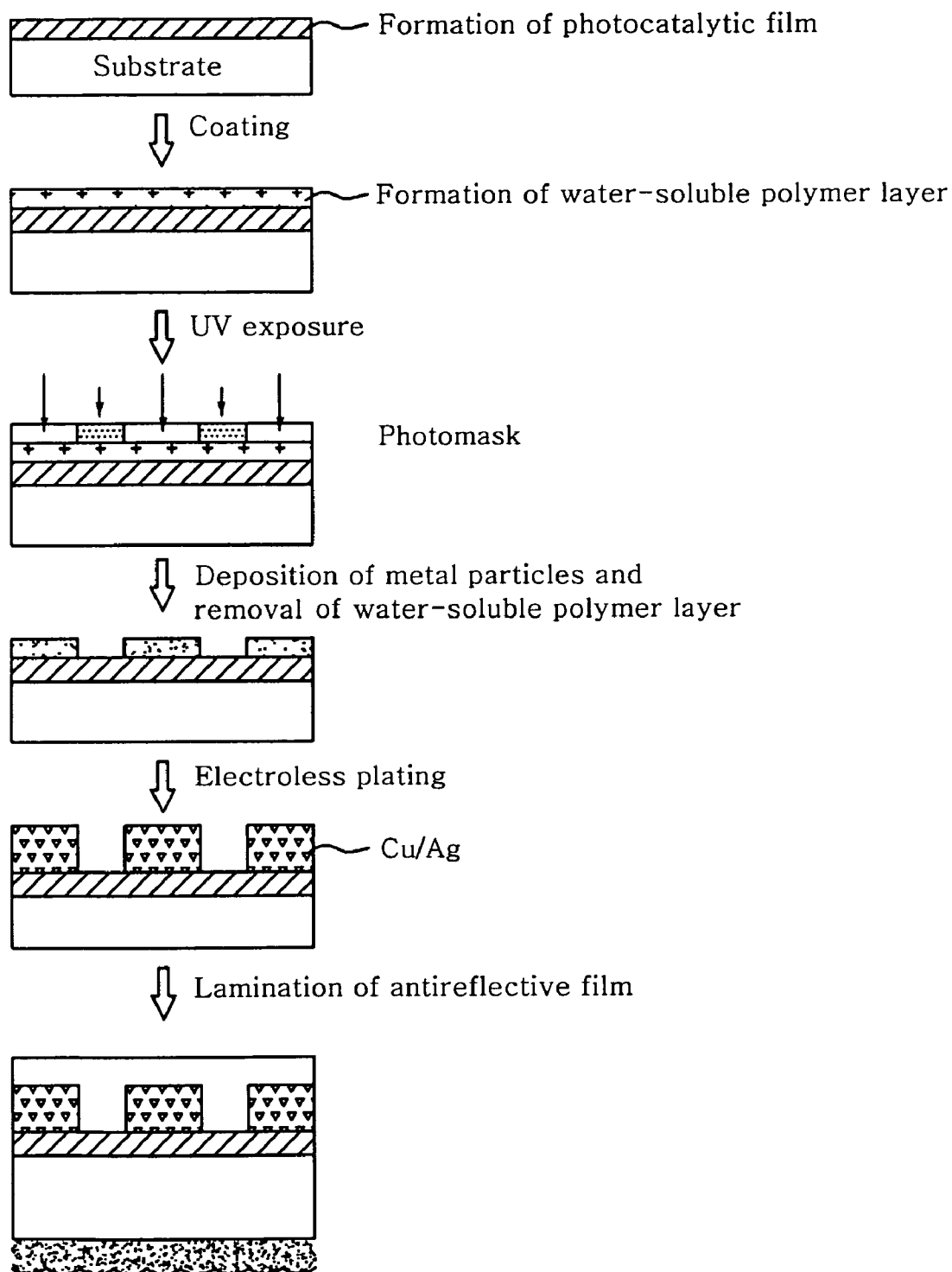


Fig. 3



OPTICAL FILTER FOR IMAGE DISPLAY DEVICES AND MANUFACTURING METHOD THEREOF

[0001] This non-provisional application claims priority under 35 U.S.C. §119(a) on Korean Patent Application No. 2004-97642 filed on Nov. 25, 2004 which is herein incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] Embodiments of the present invention relate to an optical filter for image display devices and a method for manufacturing the optical filter. More specifically, embodiments of the present invention relate to an optical filter with superior color reproduction and excellent shielding performance against infrared rays, near-infrared rays and electromagnetic waves wherein a metal pattern is directly formed on a transparent substrate and a near-infrared ray shielding and photoselective absorbing layer is formed thereon, and a method for manufacturing the optical filter.

[0004] 2. Description of the Related Art

[0005] Various kinds of image display devices, including liquid crystal displays (LCDs), plasma display panels (PDPs), electroluminescent displays (ELDs), field emission displays, and the like, are in practical use at present. Among these image display devices, plasma display panels have received a great deal of attention as large-size wall-mounted televisions and large-screen multimedia displays.

[0006] The principle of light emission of plasma display panels is as follows. First, an inert gas, such as helium, neon, argon and xenon, is charged and sealed in barrier ribs. Thereafter, application of a voltage ionizes the gas to form a plasma and emit UV rays. The emitted UV rays excite phosphors to cause the phosphors to emit light. In PDP displays, full-color display is implemented by emitting red, blue and green primary phosphors. At this time, excess fluorescence (500-620 nm wavelength) produced from neon as a filled gas is added to the emitted light, making it impossible to achieve perfect color reproduction. Furthermore, near-infrared rays of 800-1,050 nm wavelength are also radiated from PDPs, thus causing malfunction of devices using near-infrared ray remote controllers, incidence of diseases harmful to human eyes, and interference with adjacent devices. Under such circumstances, extensive research is actively being undertaken to shield harmful electromagnetic waves and near-infrared rays emitted from image display devices.

[0007] To overcome the above-mentioned problems, for example, Japanese Patent Laid-open No. Sho 61-188501 suggests a method associated with the use of a filter which absorbs light of certain wavelength range, and Japanese Patent Laid-open Nos. Hei 5-205643, 9-145918, 9-306366 and 10-26704 disclose techniques for introducing reflection-preventing functions into a filter absorbing light of certain wavelength.

[0008] On the other hand, Japanese Patent Laid-open No. 2001-13317 teaches a filter for image display devices capable of improving the color reproduction and contrast of image display devices, e.g., PDPs, and shielding harmful electromagnetic waves and infrared rays emitted from the

devices wherein a selective absorption filter layer containing a dye and a polymer binder is formed on at least one surface of a transparent support.

[0009] Korean Patent Laid-open No. 2001-26838 teaches a technique for enhancing the color purity and contrast of a color display device by shielding light reflected from the display device and light corresponding to a color between the three primary colors emitted from the display device wherein a photoselective absorption composition comprising a carbocyanine derivative dye is applied to the surface of the color display device or to a filter.

[0010] Since the above prior art techniques involve a process of forming a metal thin film, which requires high vacuum/high temperature conditions, or an exposure process for forming a fine shape and a subsequent etching process to form a mesh pattern, the overall procedure is complicated and considerable processing costs are incurred. FIG. 1 is a cross-sectional view schematically showing the structure of a conventional optical filter for image display devices. As shown in FIG. 1, the optical filter comprises an antireflective film 10 for blocking near-infrared rays and cutting neon light, a selective absorbing layer 20, a near-infrared ray shielding film 30, a glass substrate 40, an intermediate film 50 formed on the back surface of the glass substrate 40 to adhere the glass substrate 40 to a mesh pattern 60, and a transparent film 70 for protecting the substrate from damage and turbidity during etching, these layers being laminated in this order from the bottom. According to this multilayer optical filter, it is difficult to obtain thinner and lighter optical filter. Moreover, the lamination processes between the respective layers are complex, which causes problems of high manufacturing costs and reduced yield.

OBJECTS AND SUMMARY

[0011] Embodiments of the present invention have been made in view of the above problems of the prior art, and it is one object of embodiments of the present invention to provide a low-cost optical filter for image display devices, e.g., PDPs, that is capable of improving the color reproduction and contrast of images of image display devices and shielding harmful electromagnetic waves and near-infrared rays radiated from the image display devices.

[0012] It is another object of embodiments of the present invention to provide a method for manufacturing an optical filter for image display devices by forming a metal pattern in a simple and cost-effective manner and forming a near-infrared ray shielding and photoselective absorbing layer thereon, without the necessity of a sputtering process requiring high vacuum conditions, a photopatterning process using a photosensitive resin or an etching process, thereby simplifying the manufacturing procedure and reducing manufacturing costs.

[0013] In accordance with an embodiment of the present invention for achieving the above objects, there is provided an optical filter for image display devices comprising a transparent substrate, a photocatalytic film formed on the back surface of the transparent substrate, a metal pattern formed by selectively exposing the photocatalytic film to light and growing a metal crystal thereon by plating, and a near-infrared ray shielding and photoselective absorbing layer formed on the metal pattern.

[0014] In accordance with another embodiment of the present invention, there is provided a method for manufacturing an optical filter for image display devices comprising the steps of coating a photocatalytic compound on a transparent substrate to form a photocatalytic film (a first step), selectively exposing the photocatalytic compound to light and growing a metal crystal thereon by plating to form a metal pattern (a second step), and coating a resin containing a near-infrared ray shielding material and a photoselective absorbing material on the metal pattern to form a near-infrared ray shielding and photoselective absorbing layer (a third step).

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The above and other objects, features and other advantages of embodiments of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0016] **FIG. 1** is a cross-sectional view schematically showing the structure of a conventional optical filter for image display devices;

[0017] **FIG. 2** is a cross-sectional view schematically showing the structure of an optical filter for image display devices according to one embodiment of the present invention; and

[0018] **FIG. 3** shows schematic views illustrating the procedure of a method for manufacturing an optical filter for image display devices according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] Embodiments of the present invention will now be described in more detail with reference to the accompanying drawings.

[0020] **FIG. 2** is a cross-sectional view schematically showing the structure of an optical filter for image display devices according to one embodiment of the present invention. Referring to **FIG. 2**, the optical filter for image display devices according to embodiments of the present invention comprises a transparent substrate **200**, a photocatalytic film **300**, a metal pattern **400**, and a near-infrared ray shielding and photoselective absorbing layer **500**. The optical filter may also contain an antireflective film **100**.

[0021] The near-infrared ray shielding and photoselective absorbing layer **500** used in embodiments of the present invention may contain a near-infrared ray shielding material and a photoselective absorbing material. The near-infrared ray shielding material preferably is able to selectively absorb light in the near-infrared region and to transmit light in the visible region. Since the line spectra in the near-infrared region emitted from PDPs in the optical filter of embodiments of the present invention are preferably absorbed by the near-infrared ray absorbing material, there is no damage to the operation of a remote controller or an optical communication device around the PDPs. There is no particular restriction as to the kind of the near-infrared ray absorbing material used in embodiments of the present invention, but there may be used, for example, at least one material selected from the group consisting of mixed dyes of a nickel

complex and a diammonium, compound dyes containing copper ions and zinc ions, cyanine dyes, anthraquinone dyes, squarylium compounds, azomethine compounds, oxonol compounds, azo compounds and benzyldiene compounds. It is desirable to add the near-infrared ray absorbing material in an amount of 0.1 to 1 part by weight, based on 100 parts by weight of a binder resin to be added.

[0022] Preferred photoselective absorbing materials that may be used in embodiments of the present invention are octaphenyltetraazaporphyrin and tetraazaporphyrin derivative dyes wherein one ligand selected from ammonia, water and halogen is coordinately bonded to a central metal (M) atom of an octaphenyltetraazaporphyrin or tetraazaporphyrin ring. The metal (M) is at least one metal selected from the group consisting of zinc, palladium, magnesium, manganese, cobalt, copper, ruthenium, rhodium, iron, nickel, vanadium, tin and titanium, and plays a role in cutting neon light. It is desirable to add the photoselective absorbing material in an amount of 0.1 to 1 part by weight, based on 100 parts by weight of a binder resin to be added.

[0023] The near-infrared ray shielding and photoselective absorbing layer **500** may further contain a binder resin. Examples of preferred binder resins include, but are not limited to, natural and synthetic polymers, for example, polymethylmethacrylate, polyvinylbutyral, polyvinylpyrrolidone, polyvinyl alcohol, polyvinyl chloride, styrene-butadiene copolymer, polystyrene, polycarbonate, and water-soluble polyamide.

[0024] The near-infrared ray shielding and photoselective absorbing layer **500** preferably has a thickness of 1 μm to 20 μm , and more preferably 2 μm to 10 μm .

[0025] Examples of the transparent substrate **200** used in embodiments of the present invention preferably include, but are not especially limited to, transparent plastic substrates and glass substrates. As materials for the transparent plastic substrates, there may be used acrylic resins, polyesters, polycarbonates, polyethylenes, polyethersulfones, olefin-maleimide copolymers, norbornene-based resins, and the like. In the case where excellent heat resistance is required, olefin-maleimide copolymers and norbornene-based resins are preferred. Otherwise, it is preferred to use polyester films, acrylic resins, and the like.

[0026] An antireflective film **100** having reflection-preventing properties may be formed in the optical filter of embodiments of the present invention. The antireflective film **100** refracts external light incident on a PDP screen, thus preventing deterioration of image contrast and reducing visual fatigue due to reflection of the external light. The antireflective film **100** preferably has a specular reflectance of 3.0% or less. Examples of materials for the antireflective film **100** include, but are not particularly limited to, silicon-based organic materials, fluorine-based organic materials, indium tin oxide (ITO), ZnO, Al-doped ZnO, TiO₂, and ZrO.

[0027] The metal pattern **400** of the optical filter of embodiments of the present invention serves to block leakage of electromagnetic waves from PDPs. The metal pattern **400** may be formed by selectively exposing the photocatalytic film **300** formed on the back surface of the transparent substrate **300** to light and directly growing a metal crystal thereon by plating. When the metal wiring is directly formed on the transparent substrate, the adhesive force between the substrate and the metal pattern is good.

[0028] The optical filter of embodiments of the present invention may be applied to a variety of image display devices, such as liquid crystal displays (LCDs), plasma display panels (PDPs), and electroluminescent displays (ELDs). When the optical filter of embodiments of the present invention is applied to plasma display panels (PDPs) and front plates thereof, particularly advantageous effects may be achieved.

[0029] Another embodiment of the present invention is directed to a method for manufacturing an optical filter for image display devices. According to the method of an embodiment of the present invention, an optical filter for image display devices is manufactured in accordance with the following procedure. First, a photocatalytic compound is coated on the back surface of a transparent substrate to form a photocatalytic film (a first step). The photocatalytic film is selectively exposed to light to form a latent pattern acting as a nucleus for crystal growth, and then the latent pattern is subjected to plating to grow a metal crystal thereon, thereby forming a metal pattern (a second step). Thereafter, a resin containing a near-infrared ray shielding material and a selective absorbing material is coated on the metal pattern to form a near-infrared ray shielding and photoselective absorbing layer (a third step). If necessary, an antireflective film may be laminated on the front surface of the transparent substrate.

[0030] According to the method of an embodiment of the present invention, a monolayer or multilayer metal pattern may be formed in a rapid and efficient way by simple photolithography, without the need for metal sputtering requiring high vacuum and high temperature conditions, exposure and etching processes. Hereinafter, the method of an embodiment of the present invention will be explained in more detail based on the respective steps.

1. First Step: Formation of Photocatalytic Film

[0031] FIG. 3 shows schematic views illustrating the procedure of a method for manufacturing an optical filter for image display devices according to one embodiment of the present invention. Referring to FIG. 3, first, a photocatalytic compound is coated on a glass substrate to form a photocatalytic film. The term "photocatalytic compound" as used herein refers to a compound whose characteristics are changed by light. For example, the photocatalytic compound may be inactive when not exposed to light, but its reactivity is accelerated (i.e. activated) upon exposure to light, e.g., UV light. In addition, an inactive photocatalytic compound may be electron-excited by photoreaction upon light exposure, thus exhibiting a reducing ability. Preferred examples of the photocatalytic compound are Ti-containing organometallic compounds which may form TiO_x after coating and annealing.

[0032] The coating thickness of a photocatalytic film is preferably in the range of 30 nm to 1,000 nm. The photocatalytic compound may be dissolved in an appropriate solvent to prepare a coating solution, and then the coating solution may be coated on the substrate. After coating, the resulting structure may be heated on a hot plate or a microwave oven at a temperature preferably not higher than 200° C. for preferably not more than 20 minutes to form a transparent photocatalytic compound layer.

[0033] Subsequently, a water-soluble polymer compound may be coated on the photocatalytic compound layer (e.g.,

a Ti-containing organic compound layer) to form the final photocatalytic film. The water-soluble polymer layer thus formed plays a role in promoting photoreduction upon subsequent exposure to UV light, thus acting to improve the photocatalytic activity. A photosensitizer may be added to the aqueous water-soluble polymer solution to increase the photosensitivity of the water-soluble polymer layer.

2. Second Step: Formation of Latent Pattern Acting as Nucleus for Crystal Growth and Formation of Metal Pattern by Growth of Metal Crystal

[0034] The photocatalytic film formed in the first step is selectively exposed to light, e.g., UV light, using a photomask to form a latent pattern acting as a nucleus for crystal growth consisting of active and inactive portions. Exposure conditions such as exposure atmospheres and exposure doses are not especially limited, and may be properly selected according to the kind of photocatalytic compounds used. In this step, two or more metals may be grown to form a multilayer metal pattern.

[0035] As mentioned above, when the preferred photocatalytic film is exposed to UV light, electron excitation occurs in the exposed portion, thus exhibiting activity, e.g., reducibility, and as a result, reduction of metal ions takes place in the exposed portion. In this step, if necessary, the latent pattern acting as a nucleus for crystal growth may be dipped in an appropriate metal salt solution to form a metal particle-deposited pattern thereon and to completely remove the water-soluble polymer layer, in order to effectively form a metal pattern in the subsequent plating step. The deposited metal particles play a role as catalysts accelerating growth of a metal crystal in the subsequent plating step. For example, when the pattern is plated with copper, nickel or gold, treatment with the metal salt solution is preferred. As the metal salt solution, an Ag salt solution, a Pd salt solution or a mixed solution thereof is preferably used.

[0036] The latent pattern acting as a nucleus for crystal growth, or if desired, the metal particle-deposited pattern, is subjected to plating to grow a metal crystal thereon to form a metal pattern. The plating may be performed by electroless or electroplating.

[0037] In the case of the metal particle-deposited pattern formed by treating the latent pattern with a metal salt solution crystal growth may be accelerated and thus a more densely packed metal pattern may be advantageously formed.

[0038] Plating metals, e.g., Cu, Ni, Ag, Au, Co and alloys thereof, usable for the plating in embodiments of the present invention may be properly selected. To form a highly conductive metal pattern, a copper or silver compound solution is preferably used. The electroless or electroplating may be achieved in accordance with well-known procedures.

3. Formation of Near-Infrared Ray Shielding and Photoselective Absorbing Layer

[0039] A near-infrared ray shielding and photoselective absorbing layer is formed by mixing a near-infrared ray absorbing material, a photoselective absorbing material and a binder resin in an organic solvent to prepare a coating solution, coating the coating solution to a predetermined thickness on the metal pattern formed on the transparent

substrate, and curing the coating solution. In this step, the coating may be conducted by general coating techniques such as spin coating, roll coating, die coating, spray coating, and the like.

[0040] The near-infrared ray shielding and photoselective absorbing layer preferably has a thickness of 1-20 μm , and more preferably 2-10 μm .

[0041] As the binder resin, there may be used poly(methyl methacrylate), polyvinyl alcohol, polycarbonate, ethylenevinylacetate, poly(vinylbutyral), or the like. The binder resin is preferably used in an amount of 2-50 parts by weight, based on 100 parts by weight of the organic solvent.

[0042] Examples of the organic solvent include, but are not particularly limited to, toluene, xylene, propyl alcohol, isopropyl alcohol, methylcellosolve, ethylcellosolve, dimethylformamide, methyl ethyl ketone, and butylacetate.

[0043] The near-infrared ray shielding and photoselective absorbing layer 500 may further contain other additives for control of the transmittance in each wavelength range and fine color control. As such additives, there may be used common azo dyes, cyanine dyes, diphenylmethane dyes, triphenylmethane dyes, phthalocyanine dyes, xanthene dyes, diphenylene dyes, indigo, and porphyrin dyes.

EXAMPLES

[0044] Embodiments of the present invention will now be described in more detail with reference to the following examples. However, these examples are given for the illustration of preferred embodiments of the present invention only, and are not to be construed as limiting the scope of the invention.

Examples 1 to 3

[0045] A solution of polybutyl titanate (2.5 wt %) in isopropanol was applied to a transparent glass substrate by spin coating, and was then dried at 150° C. for 5 minutes to form an amorphous TiO_2 film having a thickness of 30 nm to 100 nm. Thereafter, triethanol amine as a photosensitizer was added to an aqueous solution of 5 wt % of polyvinylalcohol (Mw: 25,000). At this time, the photosensitizer was used in an amount of 1% by weight, based on the weight of the polymer. The resulting mixture was stirred, coated on the TiO_2 film, and dried at 60° C. for 2 minutes. Next, UV light having a broad wavelength range was irradiated to the coated substrate through a photomask on which a fine mesh pattern was formed using a UV exposure system (Oriel, U.S.A.). After the exposure, the substrate was dipped in a solution of PdCl_2 (0.6 g) and KCl (1 ml) in water (1 liter) to deposit Pd particles on the surface of the exposed portion. As a result, a negative pattern composed of Pd, acting as a nucleus for crystal growth, was formed.

[0046] The resulting substrate was dipped in an electroless copper plating solution to selectively grow a crystal of a metal pattern. The copper plating solution used herein was prepared so as to have a composition comprising 3.5 g of copper sulfate, 8.5 g of Rochelle salt, 22 ml of formalin (37%) as a reducing agent, 1 g of thiourea as a stabilizer, 40 g of ammonia as a complexing agent, and one liter of water. While maintaining the temperature of the copper plating solution at 35° C., the dipped substrate was subjected to electroless plating for 5 minutes to form a copper mesh

pattern having a thickness of 2 μm and a line width of 10 μm . The mesh pattern was measured to have a sheet resistance of 0.01 $\Omega/\text{sq.}$ or lower.

[0047] To impart electromagnetic waves shielding, color compensation and near-infrared ray shielding functions, a cyanine dye (TY Series[®], light absorption at 580-600 nm wavelength range, Asahi Denka, Japan), a nickel dithiol dye (NKY119[®], light absorption at 800-900 nm wavelength range, Hayashibara, Japan), a diammonium type dye (CIR 1081[®], absorption of near-infrared rays, Japan Carlit), and an Orasol series dye as an organic dye for fine color control (Ciba Special Chemical) were mixed in the same amounts, and then 6 kg of a butyl acetate solution containing 1 kg of an acrylic polymer was added thereto. The mixture was stirred for about 2 hours to prepare a coating solution. The coating solution was applied to a thickness of 20 μm to the pattern, and dried at 100° C. for 10 minutes to a thickness of 5 μm . An antireflective film was attached to the surface opposed to the substrate to fabricate an optical filter of embodiments of the present invention.

[0048] Each of the optical filters manufactured in Examples 1-3 was mounted on a PDP. Neon cut performance and visible transmittance were measured before and after mounting on the PDP using a spectrometer, and the obtained results are shown in Table 1 below.

TABLE 1

Example No.	Cyanine dye (light emission at 580-600 nm)	Visible ray transmittance	Electrical conductivity	Neon light shielding performance
Example 1	3 g	60%	$\leq 0.01 \Omega/\text{sq.}$	Good
Example 2	5 g	30%	$\leq 0.01 \Omega/\text{sq.}$	Good
Example 3	7 g	20%	$\leq 0.01 \Omega/\text{sq.}$	Excellent

[0049] As can be seen from the data shown in Table 1, optical filters of embodiments of the present invention exhibit excellent near-infrared ray shielding and neon light cutting effects and improved visible ray transmittance.

[0050] As apparent from the foregoing, according to the method of an embodiment of the present invention, a metal pattern may be formed by forming a photocatalytic compound using a simple coating technique, followed by simple plating. Accordingly, an optical filter for image display devices may be manufactured within a short time at low costs without the need for a sputtering process requiring high vacuum/high temperature conditions or a photopatterning process using a photosensitive resin or an etching process. In addition, an optical filter of embodiments of the present invention exhibits improved visibility due to superior color reproduction and reduced surface reflection, and may cut off unnecessary infrared rays and electromagnetic waves radiated from display devices. Furthermore, according to a method of an embodiment of the present invention, an unnecessary adhesive layer may be removed. Moreover, according to a method of an embodiment of the present invention, since a near-infrared ray shielding layer and a photoselective absorbing layer are combined, the structure of the optical filter is simplified, thus contributing to the reduction in weight and manufacturing costs of the optical filter.

[0051] Although preferred embodiments of the present invention have been disclosed for illustrative purposes,

those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. An optical filter for image display devices, comprising:
 - a transparent substrate;
 - a photocatalytic film formed on a back surface of the transparent substrate;
 - a metal pattern formed by selectively exposing the photocatalytic film to light and growing a metal crystal thereon by plating; and
 - a near-infrared ray shielding and photoselective absorbing layer formed on the metal pattern.
2. The optical filter according to claim 1, further comprising an antireflective film formed on a front surface of the transparent substrate.
3. The optical filter according to claim 1, wherein the near-infrared ray shielding and photoselective absorbing layer comprises:
 - at least one near-infrared ray absorbing material selected from the group consisting of mixed dyes of a nickel complex and a diammonium, compound dyes containing copper ions and zinc ions, cyanine dyes, anthraquinone dyes, squarylium compounds, azomethine compounds, oxonol compounds, azo compounds, and benzyldene compounds; and
 - at least one neon light blocking material selected from the group consisting of octaphenyltetraazaporphyrin and tetraazaporphyrin derivative dyes in which one ligand selected from ammonia, water and halogen is coordinately bonded to a central metal (M) atom of an octaphenyltetraazaporphyrin or tetraazaporphyrin ring.
4. The optical filter according to claim 1, wherein the near-infrared ray shielding and photoselective absorbing layer has a thickness of 1-20 μm .
5. The optical filter according to claim 1 wherein the transparent substrate is a glass substrate or a transparent plastic substrate selected from the group consisting of acrylic resins, polyesters, polycarbonates, polyethylenes, polyethersulfones, olefin-maleimide copolymers, and norbornene-based resins.
6. The optical filter according to claim 2, wherein the near-infrared ray shielding and photoselective absorbing layer comprises:
 - at least one near-infrared ray absorbing material selected from the group consisting of mixed dyes of a nickel complex and a diammonium, compound dyes containing copper ions and zinc ions, cyanine dyes, anthraquinone dyes, squarylium compounds, azomethine compounds, oxonol compounds, azo compounds, and benzyldene compounds; and
 - at least one neon light blocking material selected from the group consisting of octaphenyltetraazaporphyrin and tetraazaporphyrin derivative dyes in which one ligand selected from ammonia, water and halogen is coordinately bonded to a central metal (M) atom of an octaphenyltetraazaporphyrin or tetraazaporphyrin ring.

7. The optical filter according to claim 2, wherein the near-infrared ray shielding and photoselective absorbing layer has a thickness of 1-20 μm .

8. The optical filter according to claim 2 wherein the transparent substrate is a glass substrate or a transparent plastic substrate selected from the group consisting of acrylic resins, polyesters, polycarbonates, polyethylenes, polyethersulfones, olefin-maleimide copolymers, and norbornene-based resins.

9. The optical filter according to claim 2, wherein the antireflective film comprises at least one material selected from the group consisting of silicon-based organic materials, fluorine-based organic materials, indium tin oxide (ITO), ZnO, Al-doped ZnO, TiO_2 , and ZrO_2 .

10. A method for manufacturing an optical filter for image display devices, comprising the steps of:

coating a photocatalytic compound on a back surface of a transparent substrate to form a photocatalytic film (a first step);

selectively exposing the photocatalytic compound to light and growing a metal crystal thereon by plating to form a metal pattern (a second step); and

coating a resin containing a near-infrared ray shielding material and a photoselective absorbing material on the metal pattern to form a near-infrared ray shielding and photoselective absorbing layer (a third step).

11. The method according to claim 10, further comprising the step of laminating an antireflective film on a front surface of the transparent substrate.

12. The method according to claim 10, wherein the first step includes the sub-steps of:

coating a Ti-containing organic compound as the photocatalytic compound on the transparent substrate to form a Ti-containing organic compound layer; and

forming a photosensitizer-containing water-soluble polymer layer on the Ti-containing organic compound layer.

13. The method according to claim 10, wherein the metal pattern is formed by growing two or more metals by plating in the second step.

14. The method according to claim 10, wherein the coating step comprises preparing a coating solution, wherein the coating solution is prepared by mixing a near-infrared ray absorbing material, a photoselective absorbing material and a binder resin in an organic solvent;

the near-infrared ray absorbing material being at least one material selected from the group consisting of mixed dyes of a nickel complex and a diammonium, compound dyes containing copper ions and zinc ions, cyanine dyes, anthraquinone dyes, squarylium compounds, azomethine compounds, oxonol compounds, azo compounds, and benzyldene compounds; and

the photoselective absorbing material being at least one material selected from the group consisting of octaphenyltetraazaporphyrin and tetraazaporphyrin derivative dyes in which one ligand selected from ammonia, water and halogen is coordinately bonded to a central metal (M) atom of an octaphenyltetraazaporphyrin or tetraazaporphyrin ring.

15. The method according to claim 14, wherein the near-infrared ray absorbing material is used in an amount of 0.1 to 1 part by weight, based on 100 parts by weight of the binder resin, and the photoselective absorbing material is

used in an amount of 0.1 to 1 part by weight, based on 100 parts by weight of the binder resin.

16. The method according to claim 14, wherein the binder resin is selected from the group consisting of natural polymers, polymethylmethacrylate, polyvinylbutyral, polyvinylpyrrolidone, polyvinyl alcohol, polyvinyl chloride, styrene-butadiene copolymer, polystyrene, polycarbonate, and water-soluble polyamide.

17. The method according to claim 14, wherein the organic solvent is selected from the group consisting of toluene, xylene, propyl alcohol, isopropyl alcohol, methylcellosolve, ethylcellosolve, dimethylformamide, methyl ethyl ketone, and butylacetate.

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