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(54) METHOD OF MANUFACTURING COLOR FILTER ARRAY PANEL AND LIQUID CRYSTAL DISPLAY

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(57) ABSTRACT

A color filter array panel includes forming a first photosensitive film having a first amount of pigment on an insulation substrate, forming on the first photosensitive film a second photosensitive film having a second amount of pigment, greater than the first amount of pigment, and exposing and developing the first and second photosensitive films to form a first color filter and a second color filter exposing a predetermined region of the first color filter.

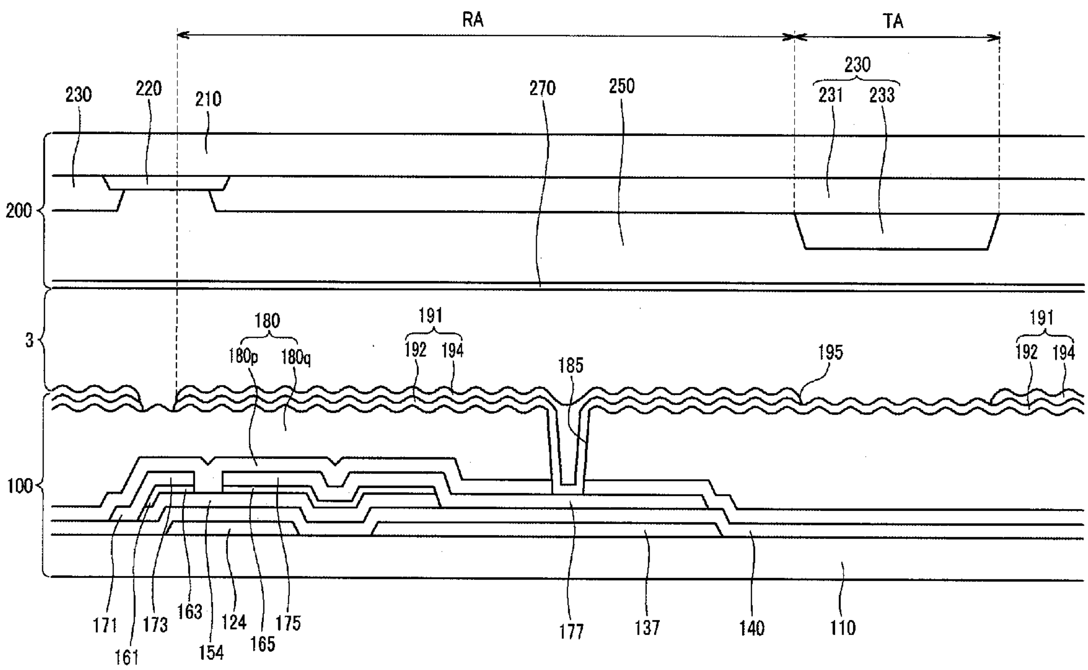


FIG.1

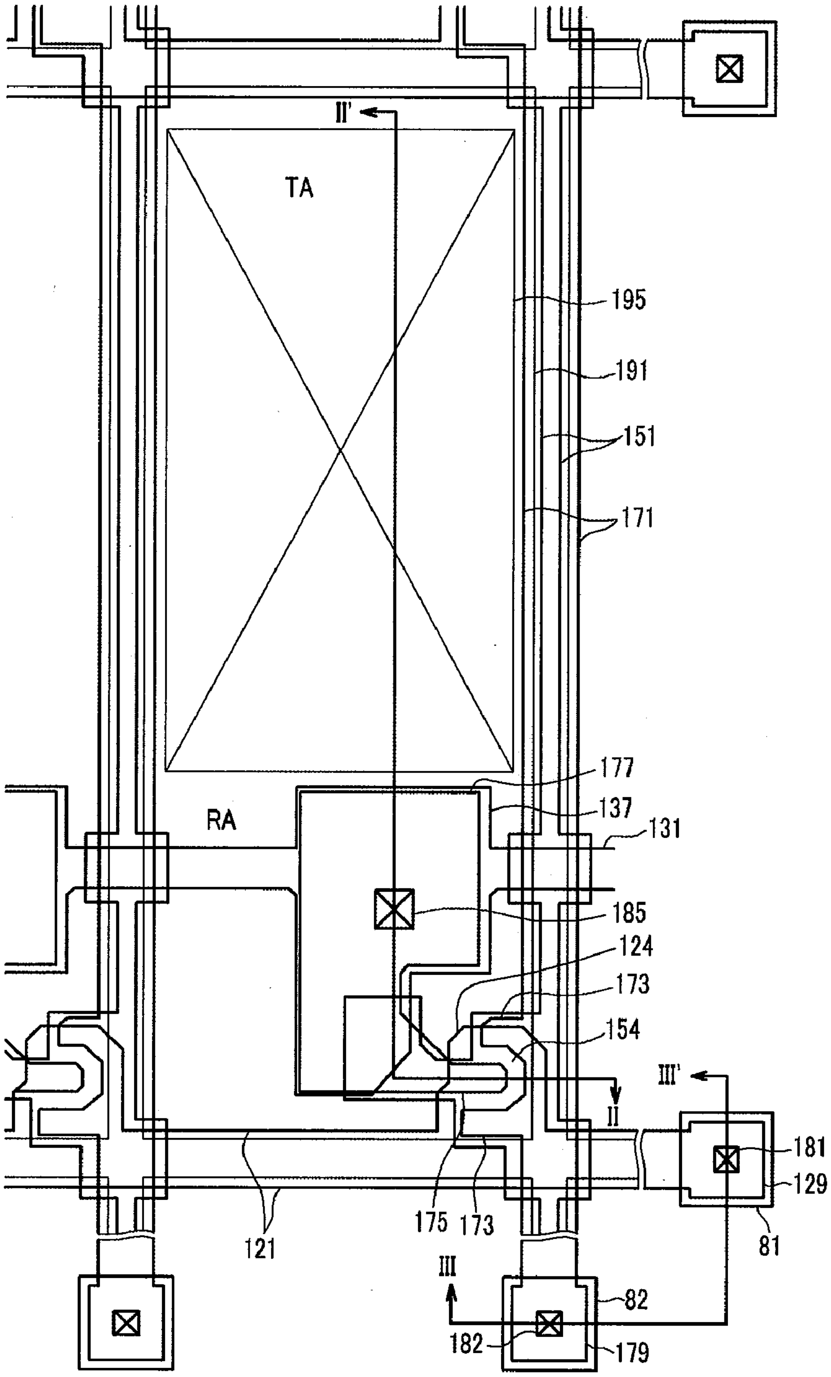
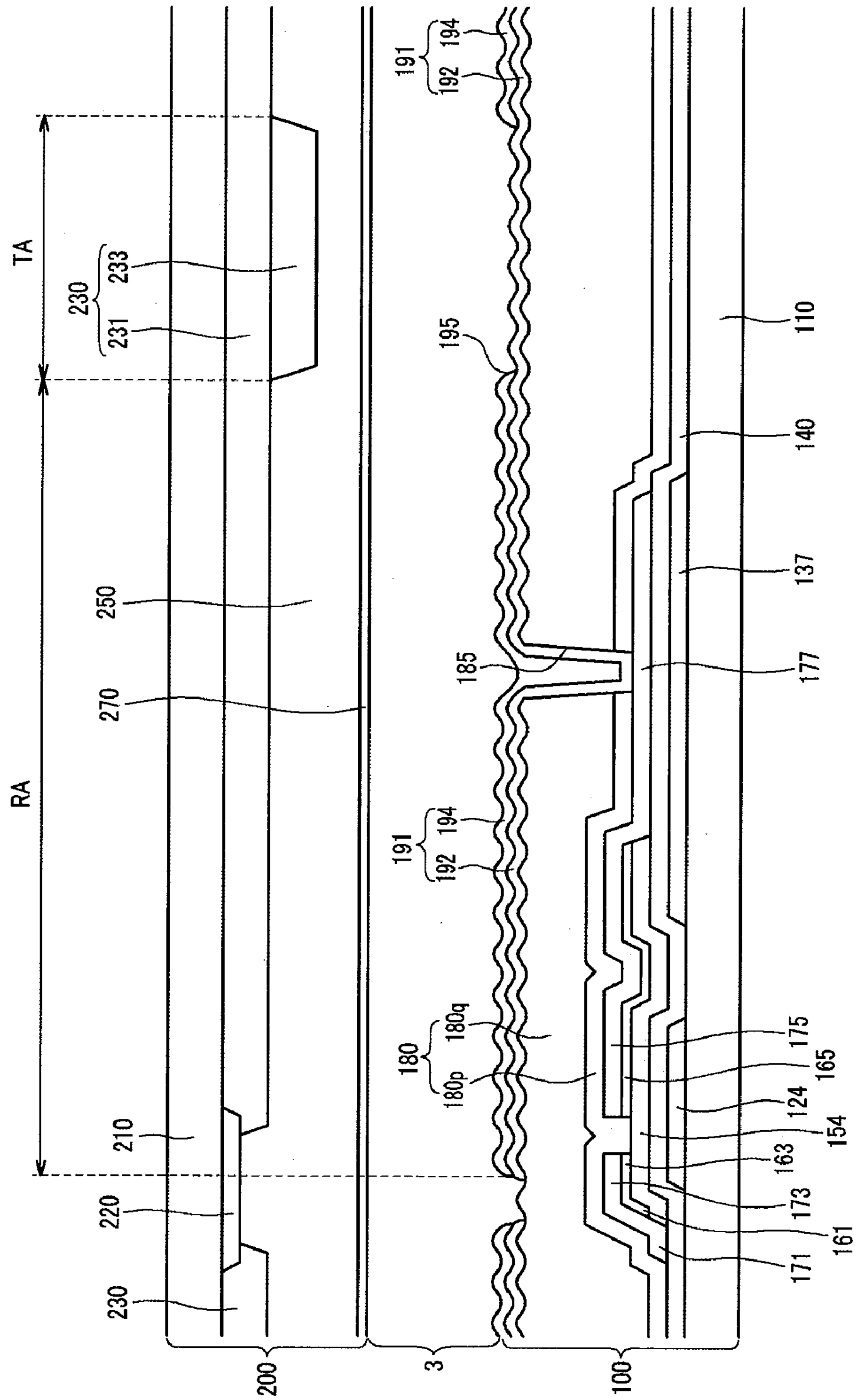

II'
TA
195
191
151
171
177
137
131
RA
185
124
173
154
III'
II
181
129
81
175
173
121
III
82
182
179

FIG.2


TA
RA
230
231
233
250
270
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220
191
192
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195
185
180
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137
177
175
165
124
154
163
173
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171
200
3
100

FIG.3

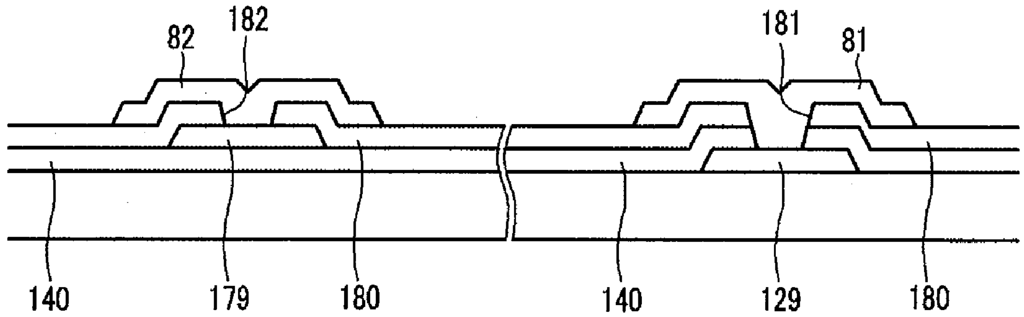


FIG.4

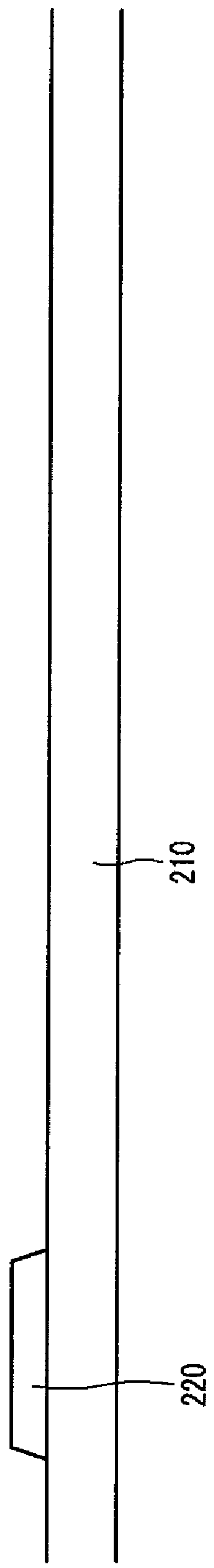


FIG.5

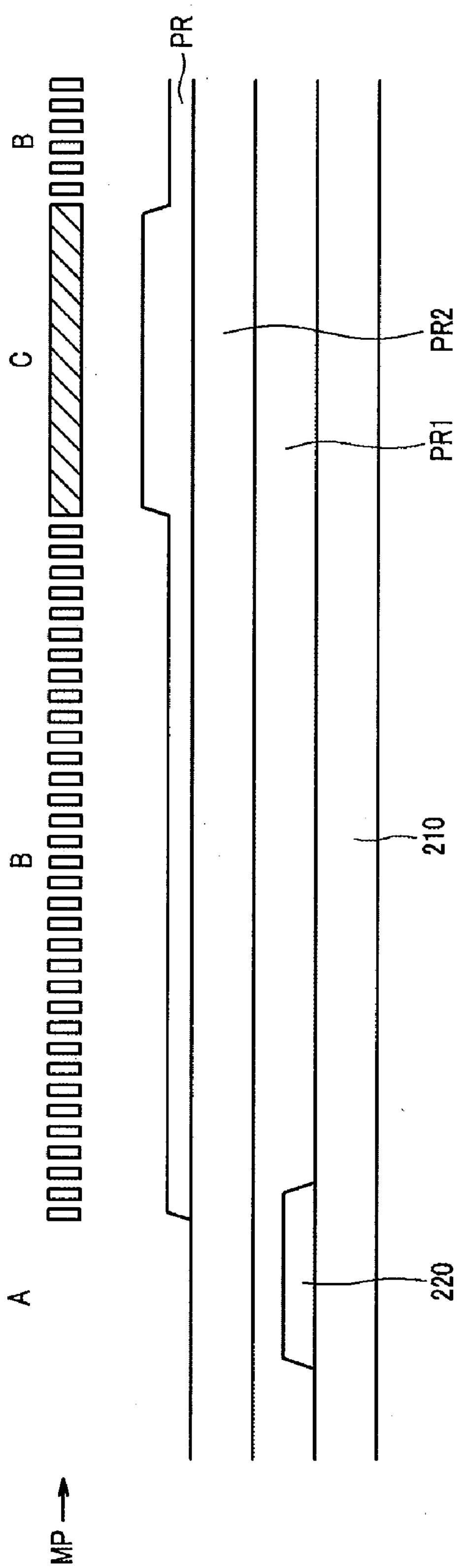


FIG.6

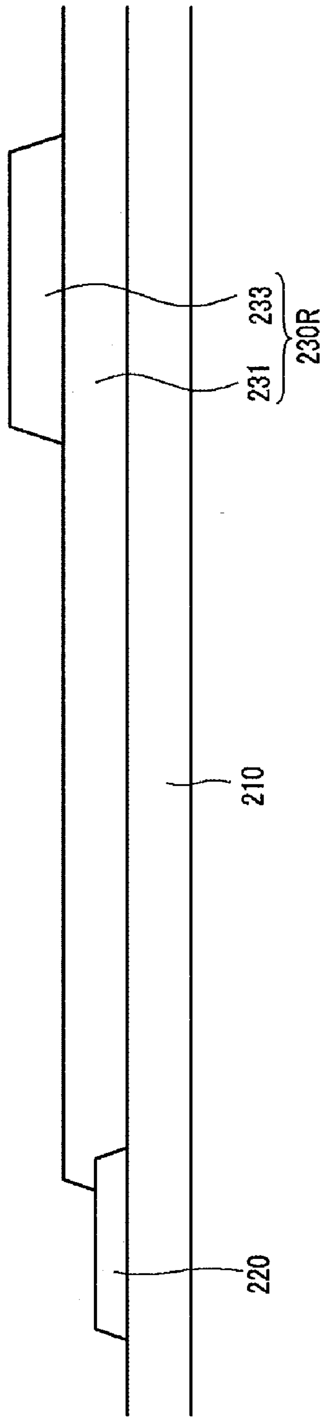
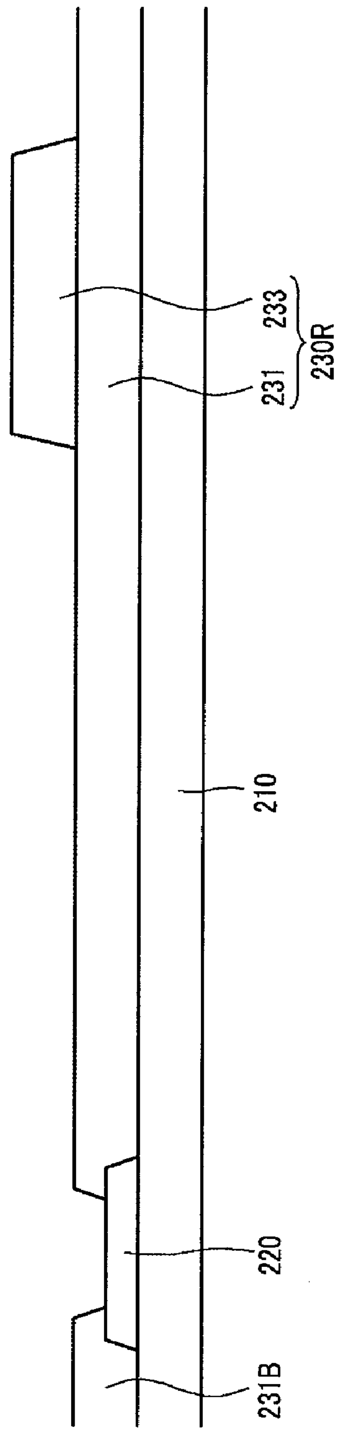


FIG.7



METHOD OF MANUFACTURING COLOR FILTER ARRAY PANEL AND LIQUID CRYSTAL DISPLAY

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2006-0022586 filed in the Korean Intellectual Property Office on Mar. 10, 2006, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] (a) Field of the Invention

[0003] The present invention relates to a liquid crystal display, and more particularly, to a transflective liquid crystal display.

[0004] (b) Description of Related Art

[0005] A liquid crystal display is now widely used as a type of flat panel display. The liquid crystal display includes two display panels on which field generating electrodes, such as pixel electrodes and a common electrode, are formed, and a liquid crystal layer interposed therebetween. When a voltage is applied to the field generating electrodes so as to generate an electric field, the orientation of liquid crystal molecules is determined, and the polarization of incident light is controlled to display images.

[0006] Examples of liquid crystal display include a transmissive liquid crystal display, a reflective liquid crystal display, and a transflective liquid crystal display, depending on the type of a light source. The transmissive liquid crystal display displays images by means of a lighting unit provided on the rear surface of the liquid crystal cell, and the reflective liquid crystal display displays images by means of natural light from the outside. Furthermore, the transflective liquid crystal display has a structure in which the transmissive liquid crystal display and the reflective liquid crystal display are combined with each other. The transflective liquid crystal display operates in two modes including a transmissive mode and a reflective mode. In the transmissive mode, the transflective liquid crystal display displays images by means of a light source integrated into the display element in a dark place where an interior or external light source is not provided. In the reflective mode, the transflective liquid crystal display displays images through the reflection of external light in a bright place, such as outdoors.

[0007] The transflective liquid crystal display has a difference in color reproducibility due to the difference between the optical paths of a transmissive portion and a reflective portion. For this reason, a method of using color filters that have light holes or different purities has been proposed to compensate for the difference in color reproducibility.

[0008] The above information disclosed in this Background section is only for enhancement of understanding of the background of the invention and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skill in the art.

SUMMARY OF THE INVENTION

[0009] According to the method of using the color filters that have different purities, the color filters having different purities are formed in the transmissive portion and the reflective portion. Accordingly, when forming a red color filter, a green color filter, and a blue color filter, it is necessary to perform a photolithography process a total of six times.

[0010] Therefore, the present invention has been made in an effort to provide a method of manufacturing a color filter array panel that has advantages of reducing the number of photolithography processes and forming color filters having different purities in a transmissive portion and a reflective portion.

[0011] A method of manufacturing a color filter array panel according to an exemplary embodiment of the present invention includes forming a first photosensitive film having pigment on an insulation substrate, forming a second photosensitive film having a larger amount of pigment than that of the first photosensitive film on the first photosensitive film, and exposing and developing the first and second photosensitive films to form a first color filter and a second color filter exposing a predetermined region of the first color filter.

[0012] The first and second photosensitive films may be simultaneously exposed using a photomask that includes three portions A, B, and C having different light transmittances in the exposing of the first and second photosensitive films.

[0013] The photomask may include a light transmissive area, a light blocking area, and a translucent area, and the translucent area may include a thin film having a slit pattern, a lattice pattern, or intermediate transmittance or intermediate thickness.

[0014] A liquid crystal display according to another exemplary embodiment of the present invention includes a first substrate; pixel electrodes that are formed on the first substrate and each of which has a reflecting electrode and a transparent electrode; a second substrate that faces the first substrate; a first color filter that is formed on the second substrate; a second color filter that is partially formed on a predetermined region of the first color filter; a common electrode that is formed on the first and second color filters and faces the pixel electrodes; and a liquid crystal layer that is interposed between the common electrode and the pixel electrodes.

[0015] The first color filter may be disposed at a position corresponding to the reflecting electrode and the transparent electrode, and the second color filter may be disposed at a position corresponding to the transparent electrode.

[0016] The second color filter may contain a larger amount of pigment than the first color filter.

[0017] The liquid crystal display may further include an overcoat that is formed between the first and second color filters and the common electrode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** is a layout view of a liquid crystal display according to an exemplary embodiment of the present invention.

[0019] FIG. **2** is a cross-sectional view of the liquid crystal display, which is taken along the line II-II' of FIG. **1**, and FIG. **3** is a cross-sectional view of the liquid crystal display, which is taken along the line III-III' of FIG. **1**.

[0020] FIGS. **4** to **7** are cross-sectional views illustrating a method of manufacturing a color filter array panel according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0021] The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. As those skilled in the art would realize, the described embodiments may be modified in various different ways, all without departing from the spirit or scope of the present invention.

[0022] In the drawings, the thickness of layers, films, panels, regions, etc., may be exaggerated for clarity. Like reference numerals designate like elements throughout the specification. It will be understood that when an element such as a layer, film, region or substrate is referred to as being "on" another element, it can be directly on the other element or intervening elements may also be present. In contrast, when an element is referred to as being "directly on" another element, there are no intervening elements present.

[0023] First, a liquid crystal display according to an exemplary embodiment of the present invention will be described in detail with reference to FIGS. **1** to **3**. FIG. **1** is a layout view of a liquid crystal display according to an exemplary embodiment of the present invention. FIG. **2** is a cross-sectional view of the liquid crystal display of FIG. **1** taken along the line II-II'. FIG. **3** is a cross-sectional view of the liquid crystal display of FIG. **1** taken along the line III-III'.

[0024] A liquid crystal display according to a present exemplary embodiment includes a thin film transistor array panel **100**, a common electrode panel **200** facing the thin film transistor array panel **100**, and a liquid crystal layer **3** that is interposed between the thin film transistor array panel **100** and the common electrode panel **200**. Liquid crystal layer **3** includes liquid crystal molecules which may be oriented perpendicular, or parallel, to the surfaces of the display panels **100** and **200**.

[0025] First, the thin film transistor array panel **100** will be described. A plurality of gate lines **121** and a plurality of storage electrode lines **131** are formed on an insulation substrate **110** made of transparent glass or plastic, for example. The gate lines **121** are used to transmit gate signals, and extend substantially in a horizontal direction. Each of the gate lines **121** includes a plurality of gate electrodes **124** protruding upward, and an end portion **129** having a large area so as to be connected to another layer or an external driving circuit. A gate driving circuit (not shown) for generating gate signals may be mounted on a flexible printed circuit film (not shown) attached on the substrate **110**, may be directly mounted on the substrate **110**, or may be integrated into the substrate **110**. When the gate driving circuit is integrated into the substrate **110**, the gate lines **121** may extend so as to be directly connected to the gate driving circuit **110**.

[0026] The storage electrode lines **131** extend substantially parallel to the gate lines **121**. Each storage electrode line **131** is provided between two adjacent gate lines **121**, and is closer to the lower one of the two adjacent gate lines **121**. The storage electrode line **131** includes a storage electrode **137** extending upward and downward. However, the shape and arrangement of the storage electrode line **131** may be modified in various ways. A predetermined voltage is applied to the storage electrode lines **131**.

[0027] The gate lines **121** and the storage electrode lines **131** may be made of an aluminum-based metal, such as aluminum (Al) or an aluminum alloy; a silver-based metal, such as silver (Ag) or a silver alloy; a copper-based metal, such as copper (Cu) or a copper alloy; a molybdenum-based metal, such as molybdenum (Mo) or a molybdenum alloy; or a metal such as chromium (Cr), tantalum (Ta), or titanium (Ti). Advantageously, each of the gate lines and storage electrode lines may be formed with a multi-layered structure. An exemplary multi-layered structure can include two conductive layers (not shown), each having different physical properties. In one exemplary embodiment, one conductive layer of a two-layered structure may be made of a low resistivity metal, so as to reduce signal delay or voltage drop. A suitable material for such a first conductive layer can be an aluminum-based metal, a silver-based metal, or a copper-based metal. The second conductive layer of the two-layered structure can be made of a different conductive material, desirably a material having excellent physical, chemical, and electrical contact characteristics with respect to ITO (indium tin oxide) and IZO (indium zinc oxide). A suitable material for such a second conductive layer can be an for example, a molybdenum-based metal, chromium, tantalum, or titanium. A first exemplary multi-layered conductive structure may have a lower layer of chromium and an upper layer of aluminum or aluminum alloy. A second exemplary multi-layered conductive structure may have a lower layer of aluminum or aluminum alloy, and an upper layer of molybdenum or molybdenum alloy. However, the gate lines **121** and the storage electrode lines **131** also may be made of other conductive materials. The side surfaces of the gate lines **121** and the storage electrode lines **131** are inclined with respect to the substrate **110**, with an angle of inclination between the side surface and the substrate being in the range of between about 30° to about 80°.

[0028] A gate insulating layer **140** made of silicon nitride (SiNx) or silicon oxide (SiOx), for example, is formed on the gate lines **121** and the storage electrode lines **131**. A plurality of semiconductor stripes **151** made of hydrogenated amorphous silicon (abbreviated to "a-Si"), or polysilicon, are formed on the gate insulating layer **140**. The semiconductor stripes **151** extend substantially in a vertical direction, and include a plurality of projections **154** protruding toward the gate electrodes **124**. Each of the semiconductor stripes **151** has an enlarged width in the vicinity of the gate lines **121** and the storage electrode lines **131**, so as to cover the gate lines **121** and the storage electrode lines **131**.

[0029] A plurality of ohmic contact stripes **161** and ohmic contact islands **165** are formed on the semiconductor stripes **151**. The ohmic contact stripes **161** and ohmic contact islands **165** may be made of silicide, or of n+-hydrogenated amorphous silicon in which n-type impurities such as phosphorus are doped at a high concentration. The ohmic contact stripes **161** include a plurality of protrusions **163**. The protrusions **163** and the ohmic contact islands **165** are provided in pairs on the projections **154** of the semiconductor stripes **151**.

[0030] The side surfaces of the semiconductor stripes **151**, the ohmic contact stripes **161**, and the ohmic contact islands **165** are inclined with respect to the substrate **110**, with an angle of inclination between the side surface and the substrate **110** being in the range of between about 30° to about 80°.

[0031] A plurality of data lines **171** and a plurality of drain electrodes **175** are formed on the ohmic contact stripes **161**, the ohmic contact islands **165**, and the gate insulating layer **140**. The data lines **171** are used to transmit data signals, and extend substantially in a vertical direction, so as to intersect the gate lines **121** and the storage electrode lines **131**. Each of the data lines **171** includes a plurality of source electrodes **173** extending toward the gate electrodes **124**, and an end portion **179**. The end portion **179** has a large area formed to be connected to another layer or to an external driving circuit. A data driving circuit (not shown) for generating data signals may be mounted on a flexible printed circuit film (not shown) attached on the substrate **110**, may be directly mounted on the substrate **110**, or may be integrated into the substrate **110**. When the data driving circuit is integrated into the substrate **110**, the data lines **171** may extend to directly connect to the data driving circuit.

[0032] The source electrodes **173** are provided as arcuate projections extending from the data lines **171**. The drain electrodes **175** are set apart from, and face, the source electrodes **173**, and are separated from the data lines **171**. Each of the drain electrodes **175**, includes an enlarged width end and a bar shape end portion. The enlarged width end portion the overlaps the storage electrode **137**, and the bar shape end portion is partially surrounded by the arcuate projections of source electrodes **173**. A portion of drain electrodes **175** and a portion of source electrodes **173** are formed overlappingly on the gate electrodes **124**. A gate electrode **124**, a source electrode **173**, a drain electrode **175**, and a projection **154** of the semiconductor stripes **151** form a thin film transistor (TFT), and a channel of the TFT is provided to the projection **154** between the source electrode **173** and the drain electrode **175**.

[0033] The data line **171** and the drain electrode **175** may be made of a refractory metal including without limitation, molybdenum, chromium, tantalum, titanium, or an alloy thereof. In addition to being formed as single layer structures, the data line **171** and the drain electrode **175** may be formed as a multi-layered structure, including, for example, a refractory metal layer (not shown) and a low-resistance conductive layer (not shown). An exemplary two-layer structure can have a lower layer made of chromium, molybdenum, or a molybdenum alloy; and an upper layer made of aluminum or an aluminum alloy. Similarly, an exemplary three-layer structure can have a lower layer and an upper layer, each made of molybdenum or an molybdenum alloy, with an intermediate layer made of aluminum or an aluminum alloy interposed therebetween. However, the compositions of data lines **171** and the drain electrodes **175** are not confined to the foregoing, and may be made of other suitable metallic materials or conductors.

[0034] The side surfaces of the data lines **171** and the drain electrodes **175** are inclined with respect to the substrate **110**, with an angle of inclination between the side surface and the substrate being in the range of between about 30° to about 80°.

[0035] The ohmic contact stripes **161** and the ohmic contact islands **165** are provided only between the semiconductor stripes **151**, and the data lines **171** and the drain electrodes **175**. In addition, the ohmic contact stripes **161** and the ohmic contact islands **165** lower the contact resistance between the semiconductor stripes, and the data lines and the drain electrodes. The semiconductor stripes **151** are narrower than the data lines **171** at many positions. However, as described above, the semiconductor stripes **151** have enlarged widths at the intersections with the gate lines **121**, to provide a smooth surface profile, thereby minimizing the disconnection of the data lines **171**. Portions of the semiconductor stripes **151** are not covered by the data lines **171** and the drain electrodes **175**, and are exposed, as are portions between the source electrodes **173** and the drain electrodes **175**.

[0036] A passivation layer **180** is formed on the data lines **171**, the drain electrodes **175**, and the portions of the exposed semiconductor stripes **151**. The passivation layer **180** includes a lower layer **180*p*** made of an inorganic insulating material, such as silicon nitride or silicon oxide, and an upper layer **180*q*** made of an organic insulating material. The upper passivation layer **180*q*** may have a dielectric constant of about 4.0 or less. In addition, it may have photosensitivity, and can have protrusions and depressions thereon. However, the passivation layer **180** also may have a single-layer structure made of an inorganic insulating material or an organic insulating material. Further, the upper passivation layer **180*q*** can be removed at the end portion **129** of the gate line **121** and at the end portion **179** of the data line **171**, if desired to reduce a difference in height.

[0037] The passivation layer **180** includes a plurality of contact holes **182** and **185** that expose the end portion **179** of the data line **171** and the drain electrode **175**, respectively. In addition, each of the passivation layer **180** and the gate insulating layer **140** includes a plurality of contact holes **181** that expose the end portion **129** of the gate line **121**. A plurality of pixel electrodes **191** and a plurality of contact assistants **81** and **82** are formed on the passivation layer **180**.

[0038] Each of the pixel electrodes **191** is embossed so as to correspond to the protrusions and depressions of the upper passivation layer **180*q***, and includes a transparent electrode **192**, and a reflecting electrode **194** on the transparent electrode **192**. The transparent electrode **192** is made of a transparent conductive material, such as ITO or IZO, and the reflecting electrode **194** is made of a reflective metallic material, including, without limitation, aluminum, silver, chromium, or an alloy thereof. The reflecting layer **194** may be a single-layered structure or a multi-layered structure. For example, the reflecting electrode **194** may have a two-layer structure that includes an upper layer (not shown) and a lower layer (not shown). The upper layer is formed of a low-resistance and reflective material, including, without limitation, aluminum, silver, or an alloy of aluminum or silver. The lower layer is formed of a molybdenum-based metal, chromium, tantalum, titanium, or other material exhibiting an excellent contact characteristic with ITO or IZO.

[0039] Because the reflecting electrode **194** is provided on a portion of the transparent electrode **192**, the transparent electrode **192** is partially exposed. Advantageously, the exposed portion of the transparent electrode **192** is disposed at an opening **195** in the reflecting electrode **194**.

[0040] The pixel electrodes **191** are physically and electrically connected to the drain electrodes **175** through the contact holes **185**, with data voltages being applied to the pixel electrodes **191** from the drain electrodes **175**. Data voltages are applied to the pixel electrodes **191**, and a common voltage is applied to the common electrode **270** of the common electrode panel **200**, generating an electric field across the liquid crystal layer **3** that is interposed between the electrodes **191** and **270**. This electric field determines the alignment direction of the liquid crystal molecules of the liquid crystal layer **3** and, thus, controls the polarization of light passing through the liquid crystal layer **3**. The pixel electrode **191** and the common electrode **270** form a capacitor (hereinafter, referred to as a "liquid crystal capacitor") that can maintain an applied voltage even after the thin film transistor is turned off.

[0041] Beneficially, a transflective liquid crystal display may include a transmissive area TA defined by the transparent electrode **192** and a reflective area RA defined by the reflecting electrode **194**. In the thin film transistor array panel **100**, the common electrode panel **200**, and the liquid crystal layer **3**, a portion below the exposed portion of the transparent electrode **192** serves as the transmissive area TA, and a portion below the reflecting electrode **194** serves as the reflective area RA. In the transmissive area TA, light from the rear surface of the liquid crystal display, that is, from the thin film transistor array panel **100**, passes through the liquid crystal layer **3** and travels to the front surface thereof, that is, the common electrode panel **200**, thereby generating a display. In the reflective area RA, light from the front surface travels to the liquid crystal layer **3**, and is then reflected by the reflecting electrode **194**. Thereafter, the light passes through the liquid crystal layer **3** again and travels to the front surface, thereby generating a display. In the latter case, the embossed surface of the reflecting electrode **194** causes light to be reflected and dispersed.

[0042] The pixel electrode **191** and the expanding portion **177** of the drain electrode **175**, which is connected to the pixel electrode **191**, overlap the storage electrode **137** and the storage electrode line **131**. The drain electrode **175** is electrically connected to the pixel electrode **191**, with an overlap forming a capacitor with the storage electrode line **131**. The capacitor is referred to as a storage capacitor, and the storage capacitor improves the voltage holding performance of the liquid crystal capacitor.

[0043] The contact assistant **81** is connected to the end portion **129** of the gate line **121** through the contact hole **181**; and the contact assistant **82** is connected at the end portion **179** of the data line **171** through the contact hole **182**. The contact assistants **81** and **82** improve the adhesive property between an external device and the end portion **129** of the gate line **121**, and the end portion **179** of the data line **171**. Further, the contact assistants **81** and **82** protect the end portion **129** of the gate line **121** and the end portion **179** of the data line **171**, respectively.

[0044] In color filter array panel **200**, a light blocking member **220** is formed on an insulation substrate **210** made of, for example, transparent glass or plastic. The light blocking member **220**, also called a black matrix, defines a plurality of opening regions facing the pixel electrodes **191**, and prevents light from leaking between the pixel electrodes **191**. In addition, a plurality of color filters **230** are formed on the substrate **210** such that almost all the color filters are disposed in the opening regions surrounded by the light blocking member **220**. The color filters **230** are arrayed in strip shapes along the pixel electrodes **191** in a vertical direction. Each of the color filters **230** can display one of the three primary colors of red, green, and blue. Each of the color filters **230** includes a first color filter **231**, and a second color filter **233** that is formed on a predetermined region of the first color filter **231**. The predetermined region of the first color filter **231** is a region corresponding to the transmissive area TA.

[0045] Desirably, the color pigment concentration in the first color filter **231** is lower than the color pigment concentration in the second color filter **233**. Accordingly, the color purity of light passing through the second color filter **233** is higher than that of light passing through the first color filter **231**.

[0046] As described above, when the color pigment concentration contained in the color filter in the transmissive area TA is different from the color pigment concentration in the reflective area RA, a color tone displayed in the transmissive area TA can be made comparable to that displayed in the reflective area RA. That is, when the color filters having the same structure are formed in the transmissive area TA and the reflective area RA, a light path in the reflective area RA is two times longer than a light path in the transmissive area TA. For this reason, the color tone displayed in the transmissive area TA is different from that displayed in the reflective area RA. Such an effect may be undesirable. However, when the dual color filters are used as described herein, light passes two times through a color filter having low color purity in the reflective area RA, and passes one time through a color filter having high color purity and a color filter having low color purity in the transmissive area TA. Accordingly, the color tone displayed in the transmissive area TA can be made comparable to that displayed in the reflective area RA. Advantageously, the thicknesses and the pigment concentrations of each of the color filter having high color purity and the color filter having low color purity can be adjusted so that the color tone displayed in the transmissive area TA can be made comparable to that displayed in the reflective area RA.

[0047] An overcoat **250** is formed on the color filter **230** and the light blocking member **220**. The overcoat **250** may be made of an organic insulating material. The overcoat **250** protects the color filter **230**, prevents the color filter **230** from being exposed, and provides a flat surface. The common electrode **270** is formed on the overcoat **250**. The common electrode **270** may be made of a transparent conductive material, such as ITO or IZO. Alignment layers **11** and **21** for orienting the liquid crystal layer **3** are formed on the inner surfaces of the display panels **100** and **200**.

[0048] Hereinafter, a method of manufacturing the color filter array panel of the liquid crystal display shown in FIGS. **1** and **2** will be described with reference to FIGS. **4** to **7**. FIGS. **4** to **7** are cross-sectional views illustrating a method of manufacturing a color filter array panel according to an exemplary embodiment of the present invention.

[0049] First, as shown in FIG. **4**, a photosensitive resin containing black pigment is applied on the substrate **210**, and is then patterned to form the light blocking member **220**. Subsequently, as shown in FIG. **5**, a first photosensitive film **PR1** is formed of a low-purity photosensitive material containing a concentration of about 7% red color pigment. Further, a second photosensitive film **PR2** is formed on the first photosensitive film **PR1**. The second photosensitive film **PR2** is made of a high-purity photosensitive material containing a greater concentration of red color pigment than the first photosensitive film PR**1**. In this exemplary embodiment, the second photosensitive film PR**2** contains a concentration of about 50% red pigment. Subsequently, the photosensitive films PR are exposed using a photomask that includes three portions A, B, and C, each having different light transmittances.

[0050] A method of forming a translucent area B on a photomask, in addition to forming a light transmissive area A, and forming a light blocking area C, is used as a method of manufacturing a photomask including three portions having different light transmittances. For example, a thin film that has a slit pattern, a lattice pattern, or intermediate transmittance and intermediate thickness with respect to a light blocking layer of the light blocking area C, can be formed in the translucent region B. When a slit pattern is used, the width of the slit, or similarly, the gap between the slits, may be smaller than the resolution of a light exposer used in the photolithography process. In an exemplary embodiment of the present invention, the translucent region B is provided in the reflective area RA.

[0051] Next, as shown in FIG. **6**, the exposed photosensitive film is developed to complete a red filter **230**R, including a first red filter **231** and a second red filter **233**. Subsequently, as shown in FIG. **7**, a blue filter **230**B and a green filter (not shown) are formed using the same method as that for forming the red filter **230**R. Other suitable and known procedures may be employed.

[0052] Next, as shown in FIGS. **1** and **2**, an organic material is applied on the substrate **210** to form the overcoat **250**, and ITO or IZO is deposited thereon using a sputtering method to form the common electrode **270**. Subsequently, processes for forming a column spacer (not shown) and an alignment layer (not shown) on the common electrode **270** are performed.

[0053] As described above, the low-purity photosensitive film, and the high-purity photosensitive film are laminated, and then are exposed and developed. Further, it is possible to form a color filter using one exposure process and one developing process, thereby simplify the process of forming the photosensitive films, as compared to a more complex forming process, in which the low-purity photosensitive film and the high-purity photosensitive film are separately formed.

[0054] While this invention has been described in connection with what is presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

What is claimed is:

1. A method of manufacturing a color filter array panel, comprising:

forming a first photosensitive film on an insulation substrate, wherein the first photosensitive film has a first color pigment concentration;

forming a second photosensitive film on the first photosensitive film, wherein the second photosensitive film has a second color pigment concentration, and wherein the second color pigment concentration is greater than the first color pigment concentration;

exposing and developing the first and second photosensitive films to form a first color filter and

a second color filter exposing a predetermined region of the first color filter.

2. The method of claim **1**, wherein the first and second photosensitive films are exposed simultaneously using a photomask that includes three portions A, B, and C, having different light transmittances in the exposing of the first and second photosensitive films.

3. The method of claim **2**, wherein the photomask includes a light transmissive area, a light blocking area, and a translucent area, wherein the translucent area includes a thin film having one of a slit pattern, a lattice pattern, an intermediate transmittance, or an intermediate thickness.

4. A liquid crystal display comprising:

a first substrate;

pixel electrodes formed on the first substrate, wherein each of the pixel electrodes has a reflecting electrode and a transparent electrode;

a second substrate that faces the first substrate;

a first color filter formed on the second substrate;

a second color filter that is partially formed on a predetermined region of the first color filter;

a common electrode that is formed on the first and second color filters, wherein the common electrode faces the pixel electrodes; and

a liquid crystal layer that is interposed between the common electrode and the pixel electrodes.

5. The liquid crystal display of claim **4**, wherein

the first color filter is disposed at a position corresponding to the reflecting electrode and the transparent electrode, and

the second color filter is disposed at a position corresponding to the transparent electrode.

6. The liquid crystal display of claim **5**, wherein the second color filter contains a second color pigment concentration that is greater than a first color pigment concentration contained in the first color filter.

7. The liquid crystal display of claim **5**, further comprising an overcoat that is formed between the common electrode, and the first and second color filters.

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摘要(译)

滤色器阵列面板包括在绝缘基板上形成具有第一量颜料的第一光敏膜，在第一光敏膜上形成具有第二量颜料，大于第一量颜料的第二光敏膜，并且曝光和显影第一和第二光敏膜以形成第一滤色器和第二滤色器，第二滤色器暴露第一滤色器的预定区域。