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(19) **United States**(12) **Patent Application Publication**
PARK(10) **Pub. No.: US 2008/0100228 A1**(43) **Pub. Date: May 1, 2008**(54) **DISPLAY DEVICE WITH RAPIDLY
CRYSTALLIZING LIGHT BLOCKING LAYER
AND METHOD OF MANUFACTURING THE
SAME**(52) **U.S. Cl. . 315/169.3; 257/72; 438/151; 257/E29.003;
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SAN JOSE, CA 95110**(21) **Appl. No.: 11/924,403**(22) **Filed: Oct. 25, 2007**(30) **Foreign Application Priority Data**

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Publication Classification(51) **Int. Cl.****G09G 3/10** (2006.01)**H01L 21/336** (2006.01)**H01L 29/04** (2006.01)(57) **ABSTRACT**

A display device that requires less manufacturing time is presented. The display device includes a light blocking member formed on a substrate, a semiconductor layer formed on the light blocking member, and a gate insulating layer formed on the semiconductor layer. Gate conductors, a first interlayer insulating layer, data conductors, a second interlayer insulating layer, and a pixel electrode are formed. A third interlayer insulating layer is deposited with an opening that extends to the pixel electrode. An organic light emitting member is formed in the opening, and a common electrode is formed. The light blocking member contains nickel and silicon oxide. The presence of nickel-and-silicon-oxide light blocking member below the semiconductor improves the crystallizing speed for the semiconductor layer, reducing the overall manufacturing time. Further, the light blocking member is disposed under the pixel electrodes to prevent light leakage, improving the contrast ratio and image quality.

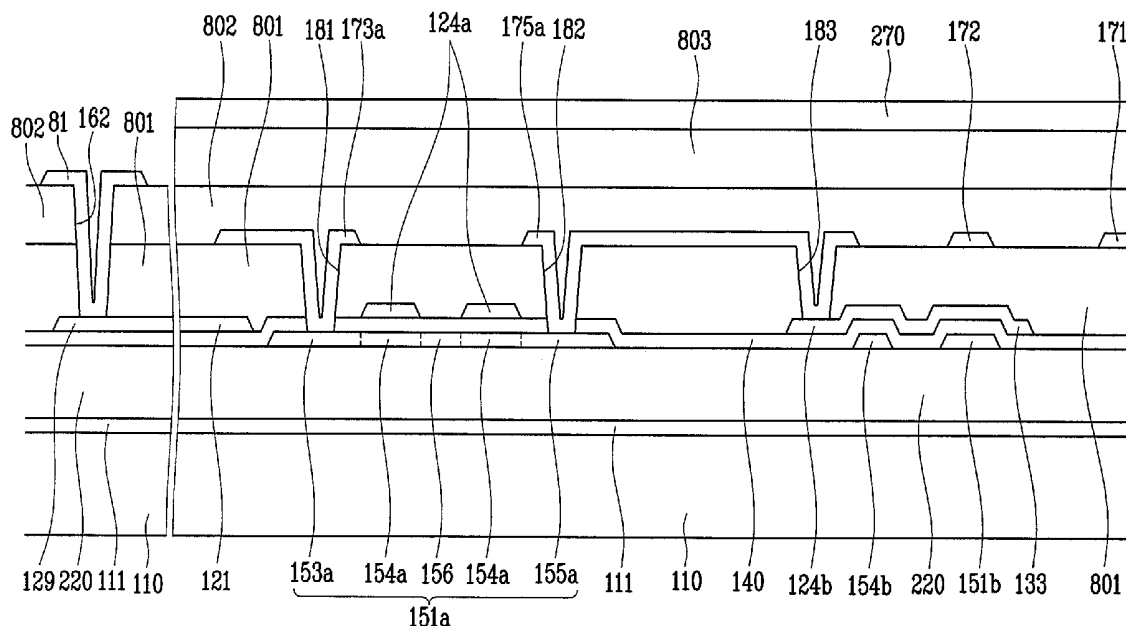


FIG. 1

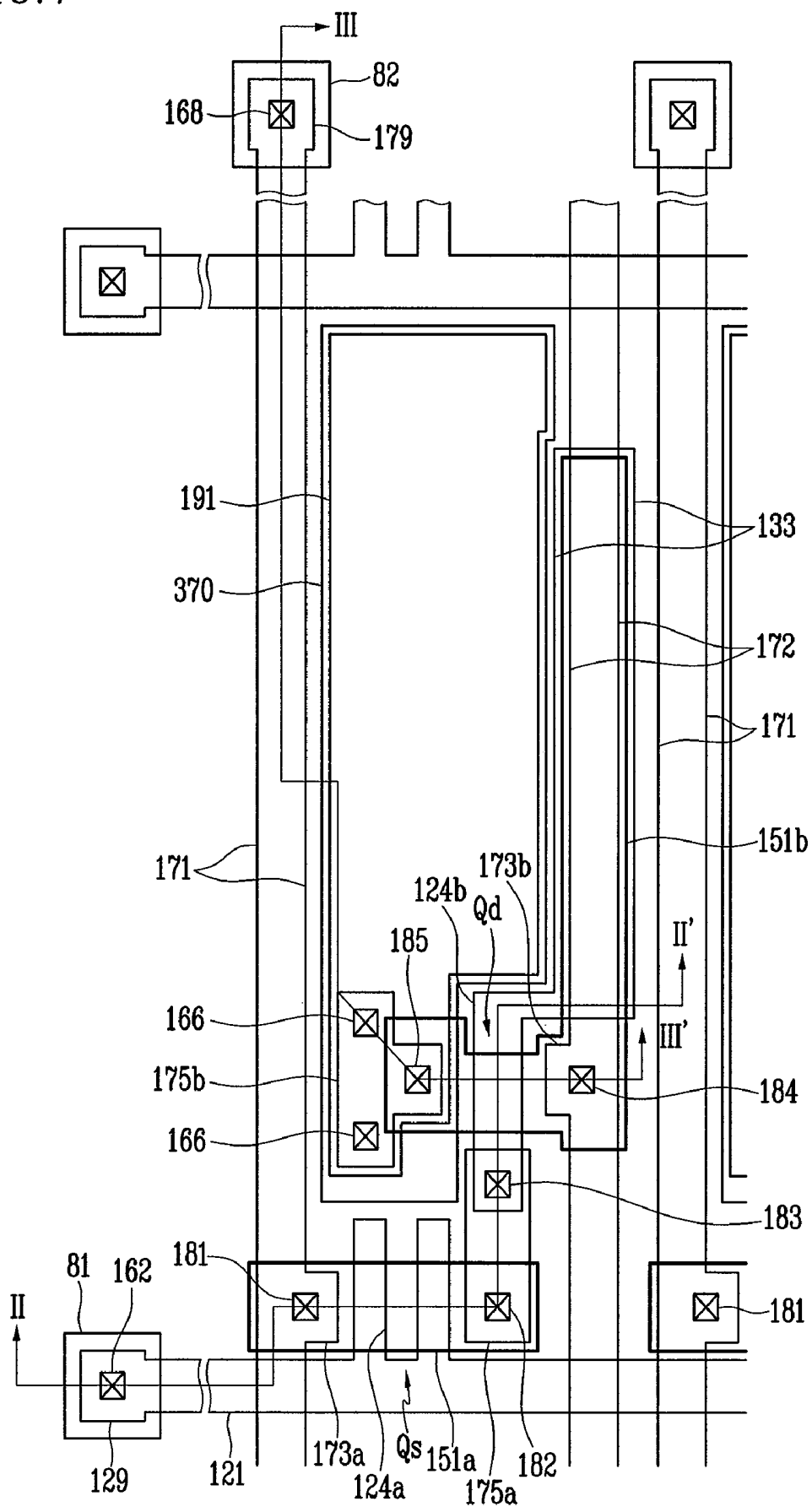


FIG. 2

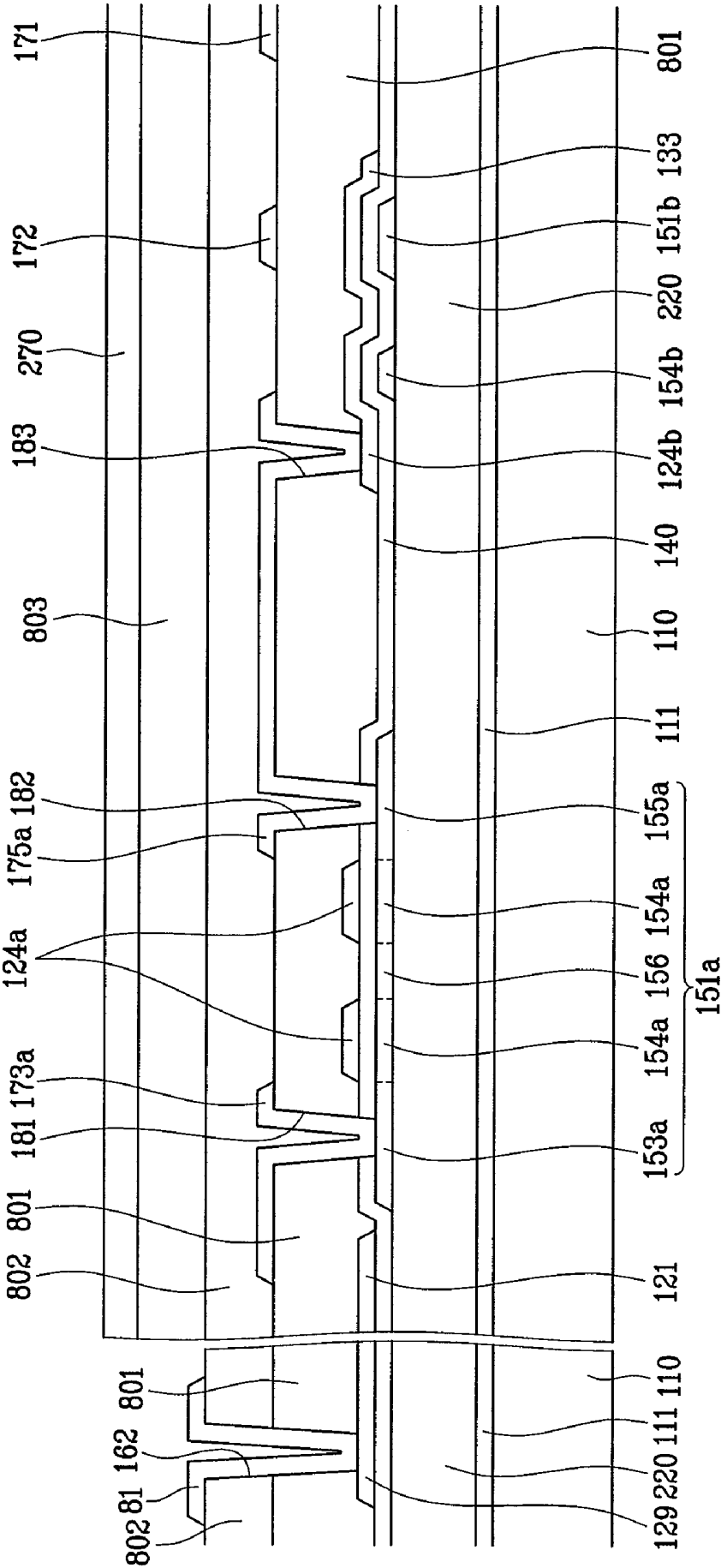


FIG. 4

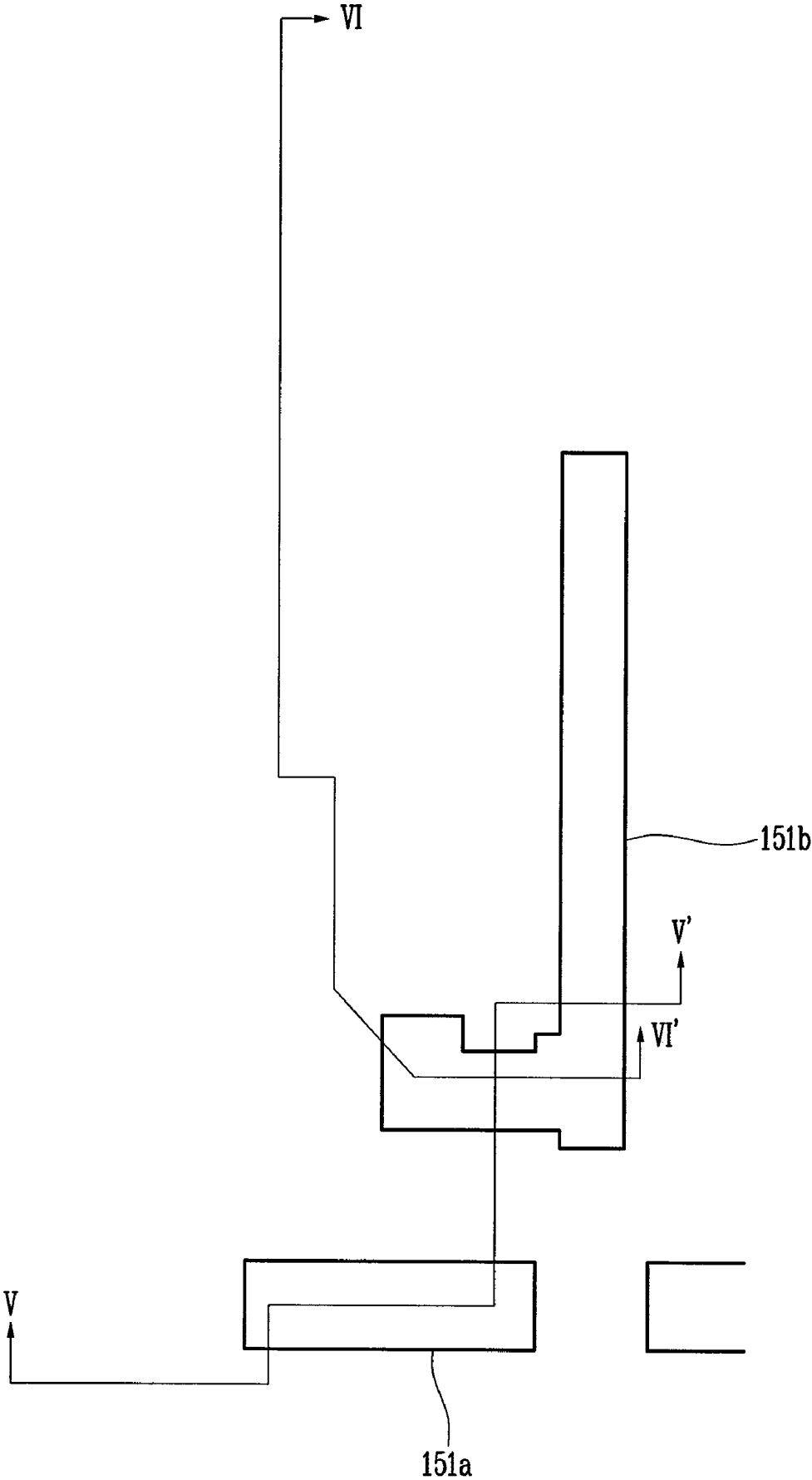


FIG. 5

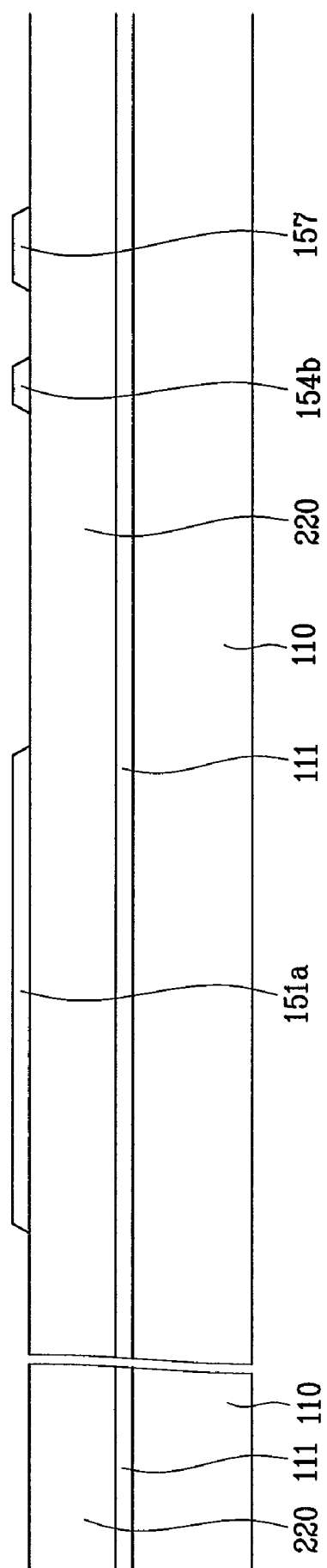


FIG. 6

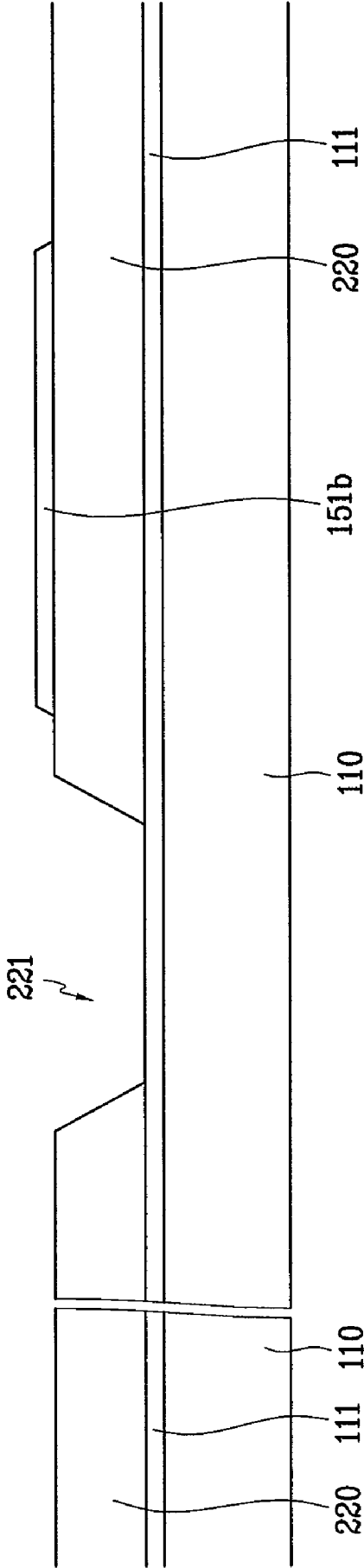


FIG. 7

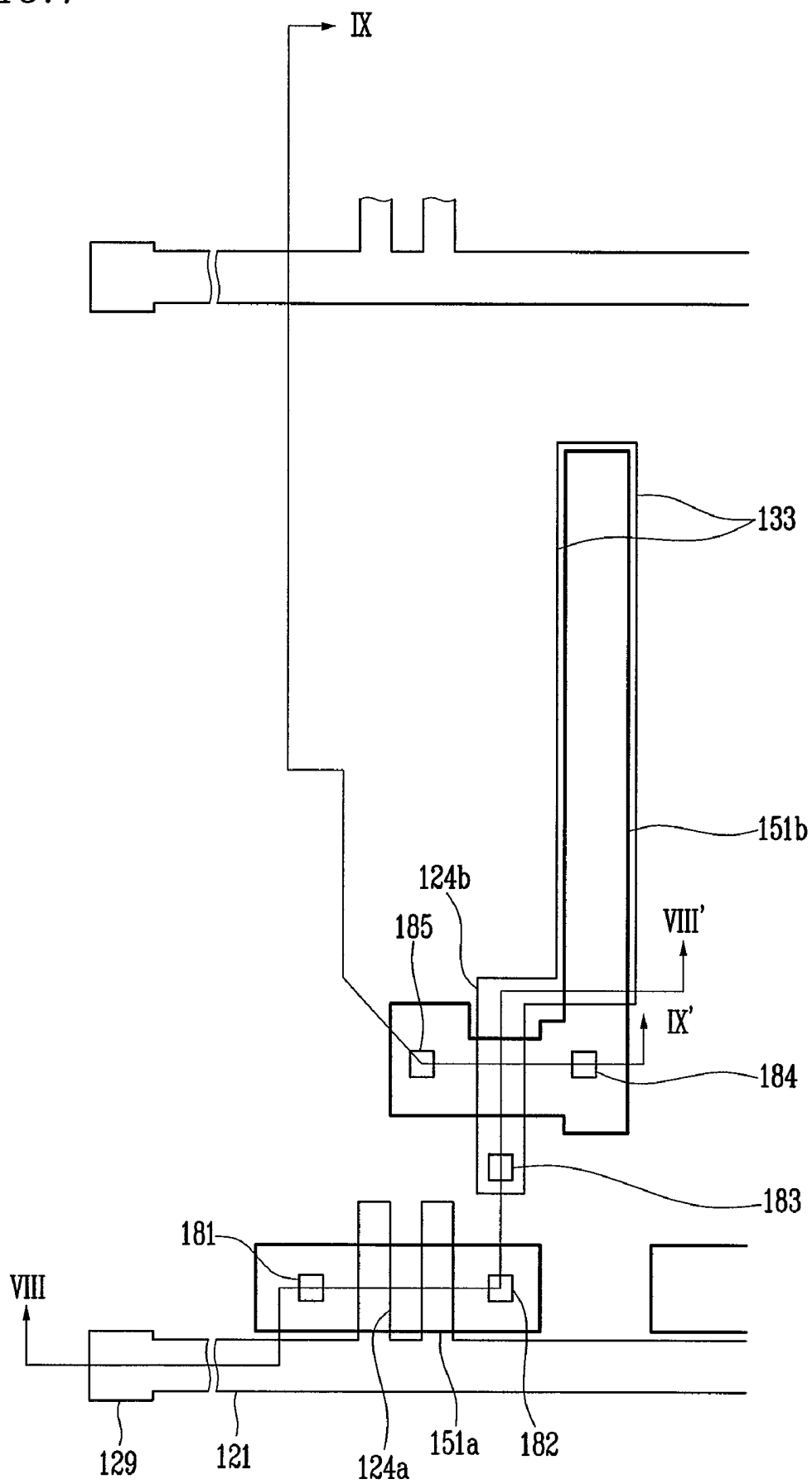


FIG. 8

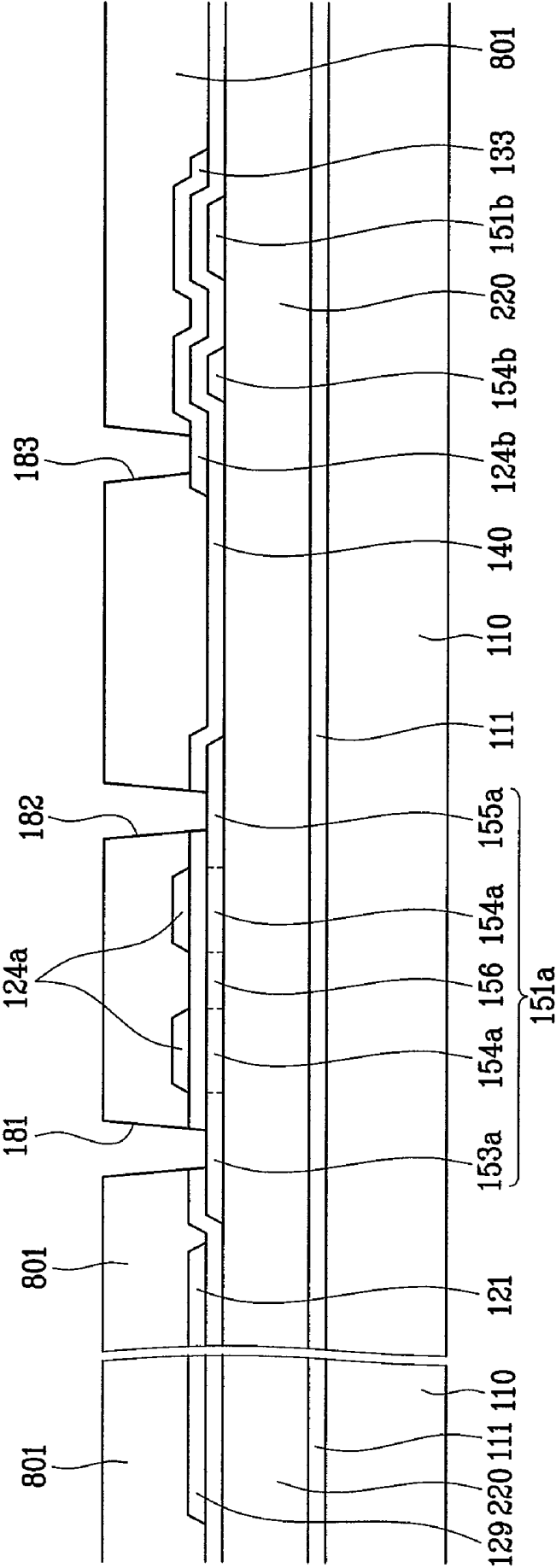


FIG. 9

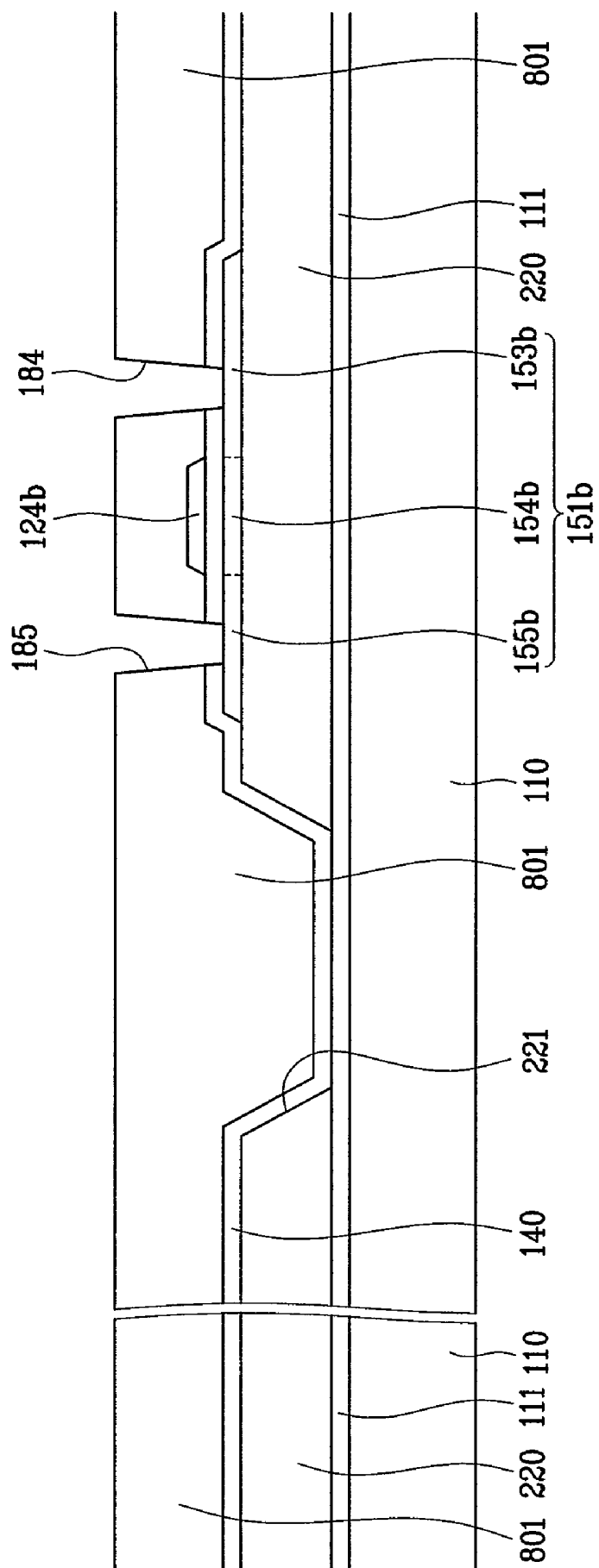


FIG. 10

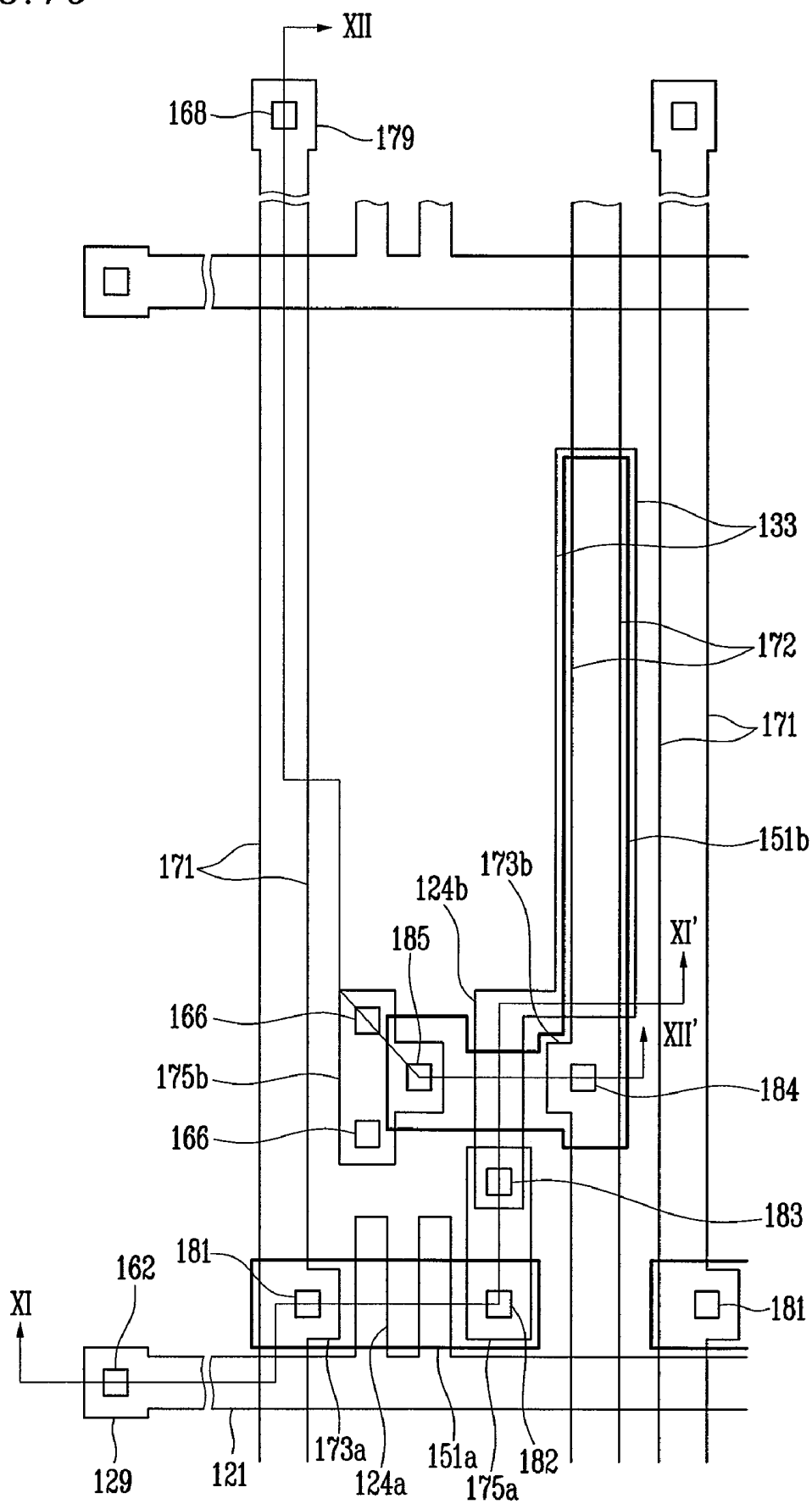


FIG. 11

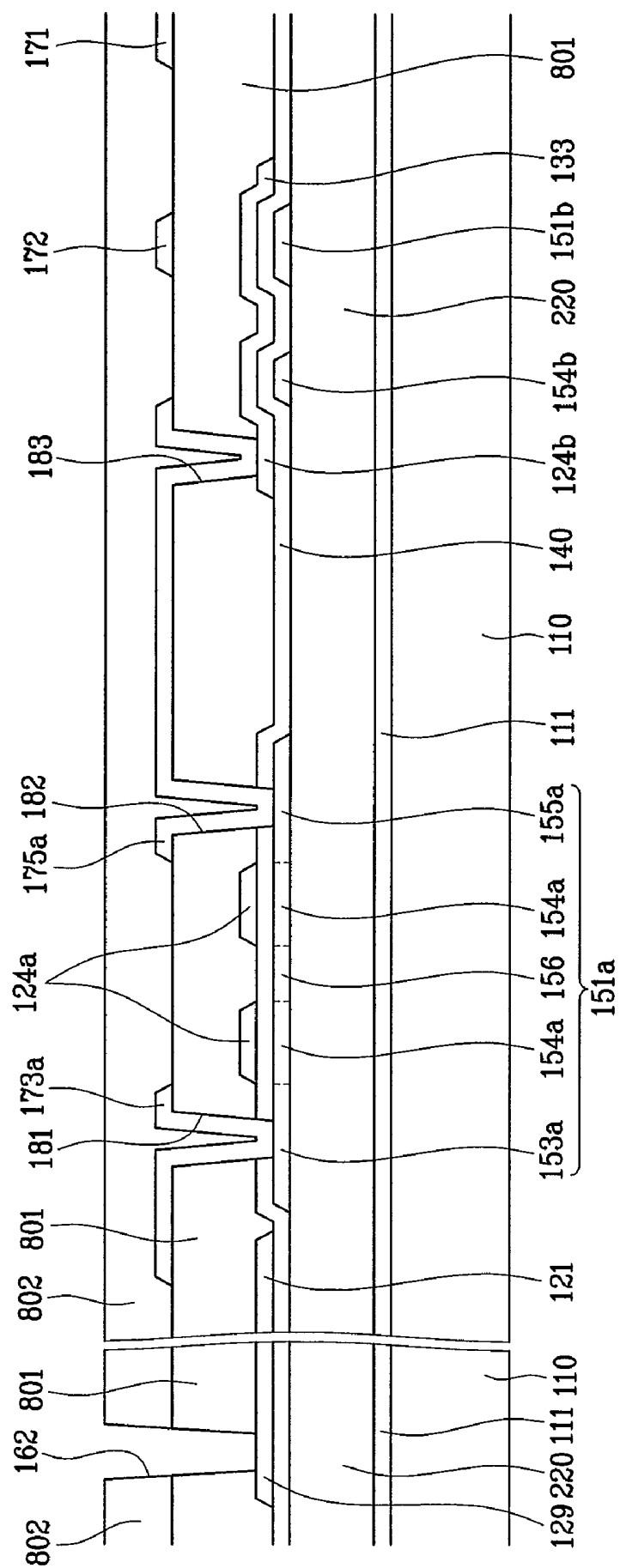


FIG. 13

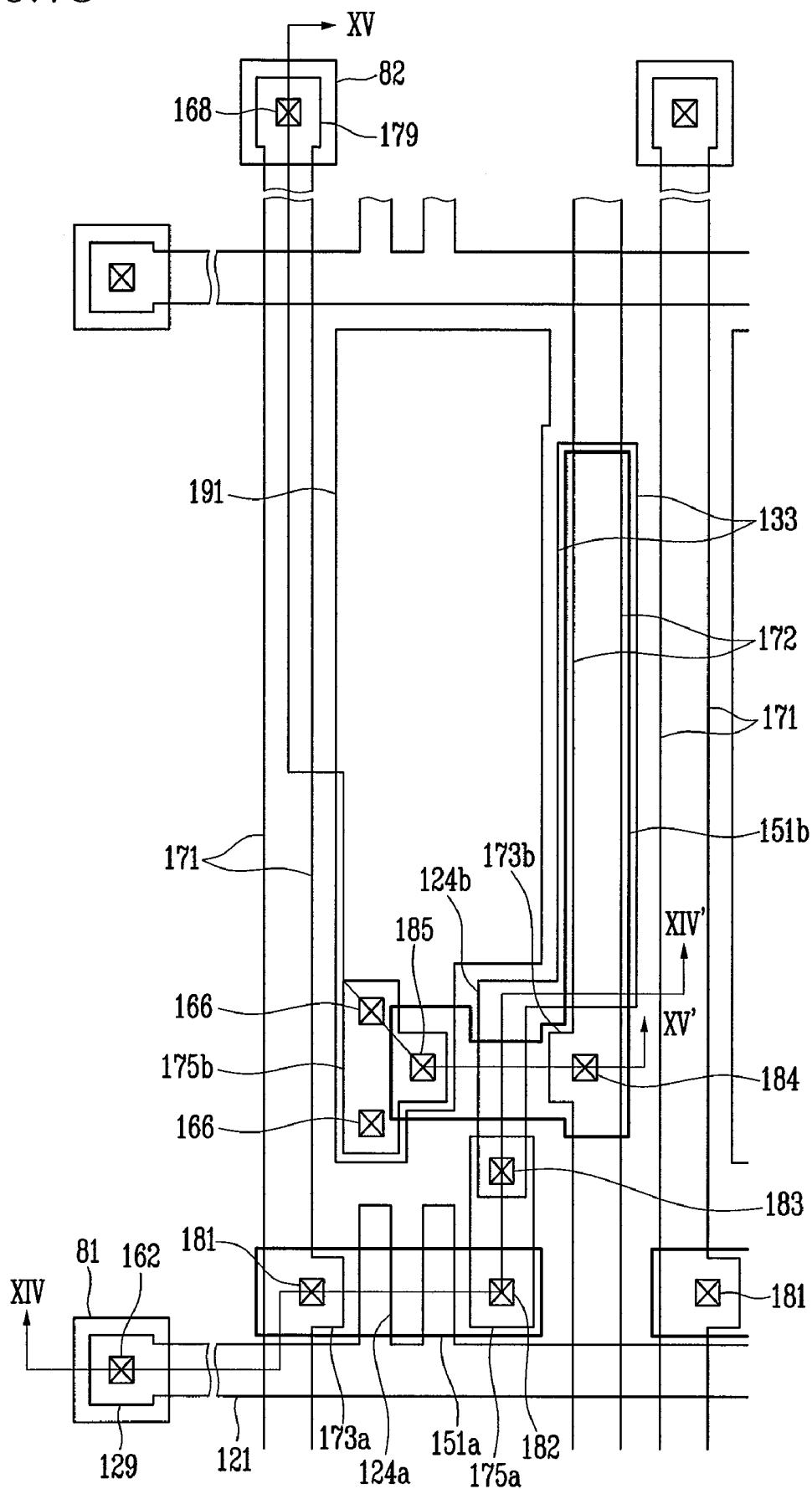
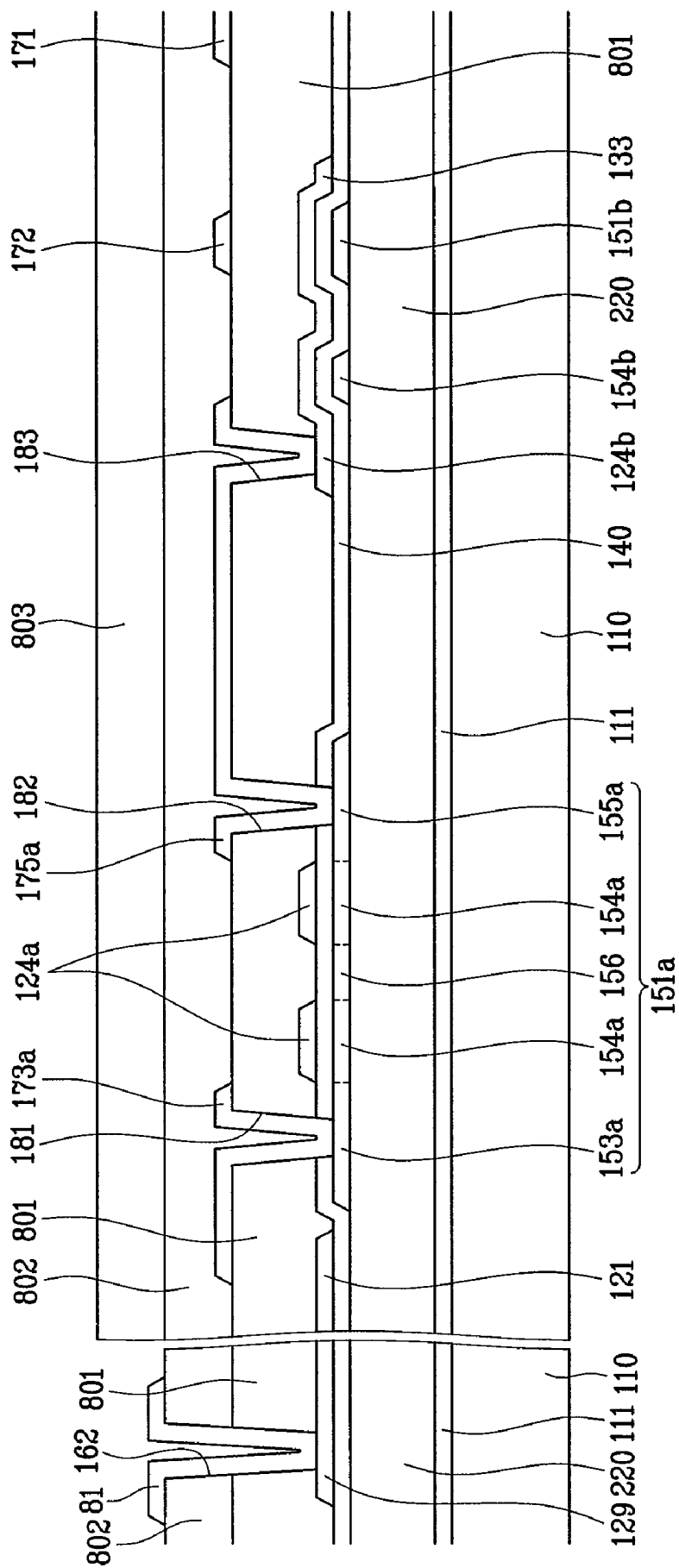


FIG. 14



**DISPLAY DEVICE WITH RAPIDLY
CRYSTALLIZING LIGHT BLOCKING
LAYER AND METHOD OF MANUFACTURING
THE SAME**

CROSS-REFERENCE TO RELATED
APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2006-0103930 filed in the Korean Intellectual Property Office on Oct. 25, 2006, the entire content of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] (a) Field of the Invention

[0003] The present invention relates to a display device and a method of manufacturing the same, and more particularly to a method of manufacturing an organic light emitting device.

[0004] (b) Description of the Related Art

[0005] In recent years, much effort is geared to reducing the weight and thickness of a display device to meet consumer demands for lighter and thinner televisions and personal computers. As a result of this effort, cathode ray tubes (CRTs) are now being replaced with flat panel display devices.

[0006] Flat panel display devices include, among others, a liquid crystal display (LCD) device, a field emission display (FED) device, an organic light emitting device (OLED), and a plasma display device (PDP).

[0007] In general, an active matrix flat panel display has a plurality of pixels that are arranged in a matrix configuration, and images are displayed by controlling the light strength of each pixel on the basis of given information about luminance. An organic light emitting device is a self-emitting type of display device that displays images by electrically exciting and emitting a fluorescent organic material. And organic light emitting device has a low power consumption requirement, a wide viewing angle, and a fast response speed of pixels that allows it to display moving pictures with a high resolution.

[0008] Such an organic light emitting device has openings surrounding the peripheries of pixel electrodes like a bank to improve outside light efficiency and characteristics of thin film transistors, and an insulating layer serving as a light blocking member.

[0009] However, as outside light is reflected by the pixel electrodes and metal wiring, it leaks out of the device, lowering the luminance of an organic light emitting device.

[0010] An expensive polarizer can be adopted to overcome the problems, but the addition of the polarizer causes deterioration in light transmission. Further, when an expensive polarizer is provided in an organic light emitting device, it causes increase of product cost.

SUMMARY OF THE INVENTION

[0011] The present invention has been made in an effort to provide a display device with an organic light emitting component having improved luminance and reduced manufacturing cost.

[0012] In one aspect, the invention is a display device that includes a substrate, a light blocking member formed on the substrate, a semiconductor layer formed on the light blocking member, a gate insulating layer formed on the semicon-

ductor, gate conductors formed on the gate insulating layer; a first interlayer insulating layer formed on the gate insulating layer and the gate conductors, data conductors formed on the first interlayer insulating layer; a second interlayer insulating layer formed on the data conductors and the first interlayer insulating layer, a pixel electrode formed on the second interlayer insulating layer; a third interlayer insulating layer having an opening extending to the pixel electrode, an organic light emitting member formed in the opening; and a common electrode formed on the organic light emitting member and the third interlayer insulating layer. The light blocking member contains nickel and silicon oxide.

[0013] The proportions of nickel and silicon oxide may be varied as a function of distance from the substrate. The semiconductor may be a polysilicon.

[0014] In another aspect, the invention is a method of manufacturing a display device. The method entails forming a light blocking member on a substrate by co-sputtering nickel and silicon oxide, forming a semiconductor layer on the light blocking member, forming a gate insulating layer on the semiconductor layer and the light blocking member, forming gate conductors on the gate insulating layer, forming a first insulating layer on the gate conductors and the gate insulating layer, forming data conductors on the first insulating layer, forming a second insulating layer on the data conductors and the first insulating layer, forming a pixel electrode on the second insulating layer, forming a third insulating layer having an opening that extends to the pixel electrode, forming an organic light emitting member in the opening, and forming the organic light emitting member and the third insulating layer.

[0015] A transmissive portion may be formed under the pixel electrodes in the forming of the light blocking member. The semiconductor may include polysilicon.

[0016] In yet another aspect, the invention is a display device that includes a substrate, a light blocking member formed the substrate, a semiconductor layer formed on the light blocking member, a gate insulating layer formed on the semiconductor layer, control electrodes formed on the gate insulating layer, a first interlayer insulating layer formed on the control electrodes and the gate insulating layer, and having contact holes, input electrodes and output electrodes formed on the first interlayer insulating layer, electrically connected with the semiconductor layer through the contact holes, and separated from each other by the control electrodes, and a second interlayer insulating layer formed on the input electrodes, output electrodes, and the first interlayer insulating layer, wherein the light blocking member includes nickel and silicon oxide. The pixel electrodes are formed on the second interlayer insulating layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a layout of a thin film transistor array panel for an organic light emitting device according to an exemplary embodiment of the present invention.

[0018] FIG. 2 and FIG. 3 are cross-sectional views of the thin film transistor array panel of FIG. 1 taken along lines II-II' and III-III', respectively.

[0019] FIG. 4 is a panel layout during the manufacture of the thin film transistor array panel of FIG. 1 according to an exemplary embodiment of the present invention.

[0020] FIG. 5 and FIG. 6 are cross-sectional views of the thin film transistor array panel of FIG. 4 taken along lines V-V' and VI-VI', respectively.

[0021] FIG. 7 is a layout of the thin film transistor array panel in a process after that of FIG. 4.

[0022] FIG. 8 and FIG. 9 are cross-sectional views of the thin film transistor array panel of FIG. 7 taken along lines VIII-VIII' and IX-IX', respectively.

[0023] FIG. 10 is a layout of the thin film transistor array panel in a process after that of FIG. 7.

[0024] FIG. 11 and FIG. 12 are cross-sectional views of the thin film transistor array panel of FIG. 10 taken along lines XI-XI' and XII-XII', respectively.

[0025] FIG. 13 is a layout of the thin film transistor array panel in a process after that of FIG. 10.

[0026] FIG. 14 and FIG. 15 are cross-sectional views of the thin film transistor array panel of FIG. 13 taken along lines XIV-XIV' and XV-XV', respectively.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0027] Hereinafter, an exemplary embodiment of the present invention is described in detail with reference to accompanying drawings such that those skilled in the art can easily make and use the invention. 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.

[0028] In the drawings, the thickness of layers, films, panels, regions, etc., are 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 "connected to/with" 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 connected to/with" another element, there are no intervening elements present.

[0029] First, an organic light emitting device according to an exemplary embodiment of the present invention is described in detail referring to FIG. 1 to FIG. 3.

[0030] FIG. 1 is a layout of a thin film transistor array panel for an organic light emitting device according to an embodiment of the invention, and FIG. 2 and FIG. 3 are cross-sectional views of the thin film transistor array panel of FIG. 1, taken along lines II-II' and III-III', respectively.

[0031] A blocking film 111 made of silicon nitride (SiNx) or silicon oxide (SiOx) is formed on an insulation substrate 110 made of transparent glass or plastic, etc. The blocking film 111 may have a multilayered structure.

[0032] A light blocking member 220 made of nickel (Ni) and silicon oxide (SiOx) is formed on the blocking film 111. When nickel is used for the light blocking member 220, the closer the nickel is to the substrate 110, the higher the concentration. When silicon oxide is used for the light blocking member 220, the closer the silicon oxide is to the substrate 110, the less the concentration. The light blocking member 220 blocks outside light. The light blocking member 220 has transmissive portions 221 through which light for displaying images passes.

[0033] A plurality of first semiconductor islands 151a and second semiconductor islands 151b made of polysilicon (poly-Si) are formed on the light blocking member 220.

[0034] An intrinsic region of the first semiconductor island 151a includes first channel regions 154a, and the high concentration extrinsic region includes a first source region 153a, an intermediate region 156, and a first drain region

155a that are separated from each other by the first channel region 154a. An intrinsic region of the second semiconductor island 151b includes a second channel region 154b, and a high concentration extrinsic region includes a second source region 153b and a second drain region 155b that are separated by the second channel region 154b.

[0035] A lightly doped extrinsic region (not shown) may be formed between the first source region 153a and the first channel region 154a, the first channel region 154a and the intermediate region 156, the first channel region 154a and the first drain region 155a, the second source region 153b and the second channel region 154b, and the second drain region 155b and the second channel region 154b. A lightly doped extrinsic region (not shown) prevents leakage current or punch-through from occurring in the thin film transistor, and may be replaced by an offset region without impurities.

[0036] A gate insulating layer 140 is formed on the semiconductors 151a and 151b and the light blocking member 220. The gate insulating layer 140 is made of silicon nitride (SiNx) or silicon oxide (SiOx).

[0037] A plurality of gate lines 121 including first control electrodes 124a and gate conductors including a plurality of second control electrodes 124b are formed on the gate insulating layer 140.

[0038] The gate lines 121 transmit gate signals and mainly extend horizontally. Each of the gate lines 121 includes a wide end 129 to connect with another layer or exterior driving circuit, and the first control electrodes 124a extend over the gate lines 121. When a gate driving circuit (not shown) generating gate signals is integrated into the substrate 110, the gate lines 121 may extend and directly connect with the gate driving circuit.

[0039] The second control electrodes 124b are separated from the gate lines 121 and include storage electrodes 133. Referring to the layout view of FIG. 1, a storage electrode 133 extends upward, turns to the right, and then extends upward again.

[0040] The gate conductors 121 and 124b may be made of an aluminum-based metal of aluminum (Al) or an aluminum alloy, a silver-based metal of silver (Ag) or a silver alloy, a copper-based metal of copper (Cu) or a copper alloy, a molybdenum-based metal of molybdenum (Mo) or a molybdenum alloy, or chromium (Cr), tantalum (Ta), titanium (Ti), tungsten (W), etc. However, the gate lines 121 and storage electrode lines 131 may have a multilayered structure including two conductive layers (not shown) having different physical properties. One of the conductive layers may be made of a metal with low resistivity, such as an aluminum-based metal, a silver-based metal, or a copper-based metal, to reduce signal delay or voltage drop in the gate lines 121 and the second control electrodes 124b. The other conductive layer may be made of other materials, particularly materials having excellent contact characteristics with indium tin oxide (ITO) and indium zinc oxide (IZO), such as a molybdenum-based metal, chromium, tantalum, titanium, etc. A chromium lower layer and an aluminum (alloy) upper layer, and an aluminum (alloy) lower layer and molybdenum (alloy) upper layer, may be referred to, by way of examples, for the composition. The gate conductors 121 and 124b, however, may be made of various other metals and conductors.

[0041] The sides of the gate conductors 121 and 124b may be inclined at an angle of inclination in the range of 30° to 80° with respect to the surface of the substrate 110.

[0042] A first interlayer insulating layer 801 is formed on the gate conductors 121 and 124b. The first interlayer insulating layer 801 may be made of silicon oxide (SiO_x).

[0043] A plurality of contact holes 181, 182, 183, 184, and 185, which expose the first and second source regions 153a and 153b and the first and second drain regions 155a and 155b, are formed on the first interlayer insulating layer 801 and the gate insulating layer 140.

[0044] A plurality of data conductors including a plurality of data lines 171, a plurality of driving voltage lines 172, and a plurality of first and second output electrodes 175a and 175b are formed on the first interlayer insulating layer 801.

[0045] The data lines 171 transmit data signals and extend vertically in the layout view of FIG. 1, perpendicularly to the gate lines 121. Each of the data lines 171 has a wide end 179 to contact a plurality of first input electrodes 173a extending toward the first control electrodes 124a and other layers or exterior driving circuits.

[0046] The driving voltage lines 172 transmit driving voltages and extend vertically in the view of FIG. 1 across the gate lines 121. Each of the driving voltage lines 172 includes a plurality of second input electrodes 173b extending toward the second control electrodes 124b. The driving voltage lines 172 overlap the storage electrodes 133 and may be connected with them.

[0047] The first and second output electrodes 175a and 175b are separated from each other and from the data lines 171 and the driving voltage lines 172. The first input electrode 173a and the first output electrode 175a are across the first control electrode 124a from each other. Similarly, the second input electrode 173b and the second output electrode 175b are across the second control electrode 124b from each other.

[0048] The first and second input electrodes 173a and 173b and the first and second output electrodes 175a and 175b may be connected with other signal lines (not shown).

[0049] When the data driving circuit (not shown) generating data signals is integrated into the substrate 110, the data lines 171 may extend to be directly connected with the data driving circuit.

[0050] The data conductors 171, 172, 175a, and 175b may be made of a refractory metal such as molybdenum, chromium, tantalum, and titanium, or alloys thereof, and may have a multilayered structure formed of a conductive layer (not shown) of a refractory metal and a conductive layer of a low resistance material (not shown). A double-layered structure including a chromium or molybdenum (alloy) lower layer and an aluminum (alloy) upper layer, or a triple-layered structure including a molybdenum (alloy) lower layer, an aluminum (alloy) intermediate layer, and a molybdenum (alloy) upper layer, may be referred to, by way of examples, as a multilayered structure. However, the data conductors 171, 172, 175a, and 175b may be formed of a variety of metals or conductors.

[0051] Similar to the gate conductors 121 and 124b, the sides of the data conductors 171, 172, 175a, and 175b may also be inclined at an angle of inclination in the range of 30° to 80° with respect to the surface of the substrate 110.

[0052] A second interlayer insulating layer 802 is formed on the data conductors 171, 173a, 173b, 175a, and 175b and the first interlayer insulating layer 801. A second interlayer insulating layer 802 has a plurality of contact holes 162, 166,

and 168 that respectively expose the ends 129 of the gate lines 121, the ends 179 of the data lines 171, and the second output electrodes 175b.

[0053] A plurality of contact assistants 81 and 82 and pixel electrodes 191 are formed on the second interlayer insulating layer 802. They may be made of a transparent conductive material such as ITO or IZO, or a reflective metal such as aluminum, silver, or an alloy thereof.

[0054] The pixel electrodes 191 are physically and electrically connected with the second output electrodes 175b through contact holes 166.

[0055] The contact assistants 81 and 82 are respectively connected with the wide ends 129 of the gate lines 121 and the wide ends 179 of the data lines 171 through the contact holes 162 and 168. The contact assistants 81 and 82 attach the wide ends 179 and 129 of the data lines 171 and gate lines 121 to outside components and protect the wide ends 179, 129.

[0056] A third interlayer insulating layer 803 is formed on the second interlayer insulating layer 802. The third interlayer insulating layer 803 is formed of an organic insulator or an inorganic insulator, and has an opening 865 at the pixel electrode 191. The third interlayer insulating layer 803 may be formed of a photoresist including a black pigment. The third interlayer insulating layer 803 blocks outside light together with the light blocking member 220.

[0057] An organic light emitting member 370 is formed in the opening 865 defined by the third interlayer insulating layer 803. The organic light emitting member 370 is made of an organic material that emits any one of three primary colors of red, green, and blue. The organic light emitting device displays a desired image by spatially combining the primary colors of the organic light emitting members 370.

[0058] The organic light emitting member 370 may have a multilayered structure that includes an auxiliary layer (not shown) for improving light-emitting efficiency of the emission layer, other than the emission layer (not shown) for emitting light. The auxiliary layer may be an electron transport layer (not shown) and a hole transport layer (not shown) for balancing electrons and holes, and an electron injecting layer (not shown) and a hole injecting layer (not shown) for injection of electrons and holes.

[0059] A common electrode 270 is formed on the organic light emitting member 370 and the third interlayer insulating layer 803. A common voltage V_{ss} is applied to the common electrode 270, which is made of a reflective metal including Ca, Ba, Mg, Al, and Ag, or a transparent conductive material such as ITO or IZO.

[0060] In the organic light emitting device, the first control electrode 124a connected with the gate line 121, and the first input electrode 173a and the first output electrode 175a connected with the data line 171, form a switching thin film transistor (switching TFT) Qs, together with the first semiconductor island 151a. A channel for the switching thin film transistor Qs is formed at the first channel region 154a between the first input electrode 173a and the first output electrode 175a. The second control electrode 124b connected with the first output electrode 175a, the second input electrode 173b connected with the driving voltage line 172, and the second output electrode 175b connected with the pixel electrode 191 form a thin film transistor (driving TFT) Qd together with the second semiconductor island 151b. A channel for the thin film transistor Qd is formed at the

second channel region **154b** between the second input electrode **173b** and the second output electrode **175b**.

[0061] A pixel electrode **191**, the organic light emitting member **370**, and the common electrode **270** form an organic light emitting diode LD, and the pixel electrode **191** serves as an anode and the common electrode **270** serves as a cathode (alternatively, the pixel electrode **191** serves as a cathode and the common electrode **270** serves as an anode). A storage electrode **133** and a driving voltage line **172** overlap to form a storage capacitor Cst.

[0062] The organic light emitting device displays an image by emitting light above or below the substrate **110**. Opaque pixel electrodes **191** and a transparent common electrode **270** are applied to a top emission type of organic light emitting device that displays an image above the substrate **110**, and the transparent pixel electrodes **191** and the opaque common electrode **270** are applied to a bottom emission type of organic light emitting device that displays an image below the substrate **110**.

[0063] A method of manufacturing the organic light emitting device shown in FIG. 1 to FIG. 3 is described hereafter in detail with reference to FIG. 4 to FIG. 15.

[0064] FIG. 4 is a panel layout during the manufacture of the thin film transistor array panel of FIG. 1 according to an exemplary embodiment of the present invention, and FIG. 5 and FIG. 6 are cross-sectional views of the thin film transistor array panel of FIG. 4 taken along lines V-V' and VI-VI', respectively. FIG. 7 is a layout of the thin film transistor array panel in a process following that of FIG. 4, FIG. 8 and FIG. 9 are cross-sectional views of the thin film transistor array panel of FIG. 7 taken along lines VIII-VIII' and IX-IX', respectively, FIG. 10 is a layout of the thin film transistor array panel in the next process of FIG. 7, and FIG. 11 and FIG. 12 are cross-sectional views of the thin film transistor array panel of FIG. 10 taken along lines XI-XI' and XII-XII', respectively. FIG. 13 is a layout of the thin film transistor array panel in a process following that of FIG. 10, and FIG. 14 and FIG. 15 are cross-sectional views of the thin film transistor array panel of FIG. 13 taken along lines XIV-XIV' and XV-XV', respectively.

[0065] First, as shown in FIG. 4 to FIG. 6, a blocking film **111** is formed by depositing silicon oxide on an insulation substrate **110**.

[0066] A light blocking member **220** is formed on the blocking film **111** by co-sputtering nickel and silicon oxide. Concentrations of nickel and silicon oxide may be varied as a function of distance from the substrate **110**. The light blocking member **220** is completed by forming transmissive portions **221** in the pixel area by patterning the light blocking member. When nickel is used for the light blocking member **220**, the nickel concentration is varied so that it is higher closer to the substrate **110**. When silicon oxide is used for the light blocking member **220**, its concentration is varied so that it is lower closer to the substrate **110**. The light blocking member **220** blocks outside light from entering the device.

[0067] An amorphous semiconductor layer is then deposited on the light blocking member **220**. First and second semiconductor islands **151a** and **151b** are formed by polycrystallizing and patterning the semiconductor layer using laser heat treatment (laser annealing), furnace heat treatment (furnace annealing), or sequential lateral solidification (SLS).

[0068] The infinitesimal amount of nickel included in the light blocking member **220** is diffused by heat applied during the laser heat treatment (laser annealing), furnace heat treatment (furnace annealing), or sequential lateral solidification (SLS). The diffused nickel induces solidification of the first and second semiconductor islands **151a** and **151b**, called metal induced crystallization (MIC). The nickel of the light blocking member **220** is a polycrystallizing seed for polycrystallizing an amorphous semiconductor.

[0069] Accordingly, with the method of the present invention, the polycrystallization speed of the amorphous semiconductor for forming the first and second semiconductor islands **151a** and **151b** is faster and more crystals can be formed at a lower temperature compared to with the conventional method. Further, the cost for manufacturing an organic light emitting device is reduced.

[0070] After forming the first and the second semiconductor islands **151a** and **151b**, as shown in FIG. 7 to FIG. 9, a gate insulating layer **140** is formed on the light blocking member **220** and the semiconductor islands **151a** and **151b**. Gate lines **121** having first control electrodes **124a** and second control electrodes **124b**, and storage electrodes **133** are formed on the gate insulating layer **140**. The second control electrodes **124b** are electrically connected with the storage electrodes **133**.

[0071] By using the gate lines **121**, the second control electrodes **124b**, and the storage electrodes **133** as a mask, impurities are injected into the first and second semiconductor islands **151a** and **151b**. Accordingly, regions of the semiconductor islands **151a** and **151b** under the first control electrodes **124a** and the second control electrodes **124b** are a first channel region **154a** and a second channel region **154b**, respectively. The first source region **153a** and the first drain region **155a** of the first semiconductor island **151a** are separated by the first channel regions **154a**, and an intermediate region **156** is formed between the first channel regions **154a**. Similarly, the second source region **153b** and the second drain region **155b** of the second semiconductor island **151b** are separated by the second channel region **154b**.

[0072] A first interlayer insulating layer **801** having contact holes **181**, **182**, **183**, **184**, and **185** is then formed on the gate insulating layer **140** and the gate conductors **121** and **124b**. The first interlayer insulating layer **801** may be made of silicon oxide (SiO_x) or silicon nitride (SiN_x).

[0073] The contact holes **181**, **182**, **183**, **184**, and **185** of the first interlayer insulating layer **801** expose portions where the first and second source regions **153a** and **153b**, the first and second drain regions **155a** and **155b**, and the second control electrodes **124b** are positioned.

[0074] As shown in FIG. 10 to FIG. 12, data lines **171**, first output electrodes **175a**, driving voltage lines **172**, and second output electrodes **175b** are formed on the first interlayer insulating layer **801**.

[0075] The data lines **171** include first input electrodes **173a** electrically connected with the first source region **153a** through the contact holes **181**, and the driving voltage lines **172** include second input electrodes **173b** electrically connected with the second source region **153b** through the contact holes **184**. The first output electrodes **175a** are electrically connected with the first drain region **155a** and the second control electrodes **124b** through the contact holes **182** and **183**, and the second output electrodes **175b** are

electrically connected with the second drain region **155b** through the contact holes **185**.

[0076] Subsequently, a second interlayer insulating layer **802** having contact holes **162**, **166**, and **168** is formed on the data conductors **171**, **172**, **175a**, and **175b** and the first interlayer insulating layer **801**. The contact hole **162** exposes the end **129** of the gate line **121**, the contact hole **166** exposes the second output electrode **175b**, and the contact hole **168** exposes the wide end **179** of the data line **171**.

[0077] As shown in FIG. **13** to FIG. **15**, pixel electrodes **191** and contact assistants **81** and **82** are formed on the second interlayer insulating layer **802**.

[0078] The pixel electrodes **191** are electrically connected with the second output electrodes **175b** exposed through the contact holes **166**, and the contact assistants **81** and **82** are respectively electrically connected with the ends **129** of the gate lines **121** and the ends **179** of the data lines **171**.

[0079] The third interlayer insulating layer **803** having the opening **865** that extends to the pixel electrode **191** is then formed on the second interlayer insulating layer **802**. An organic light emitting member **370** is formed inside the openings **865** of the third interlayer insulating layer **803**.

[0080] The third interlayer insulating layer **803** may be formed of a photoresist, and prevents outside light from leaking into the device together with the light blocking member **220**. Accordingly, the contrast ratio and quality of the image are improved by blocking the outside light that would be reflected by the gate conductors **121**, **124a**, **124b**, the data conductors **171**, **172**, **175a**, **175b**, and the pixel electrodes **191**, and preventing any inside light from leaking out. The common electrode **270** is subsequently formed on the third interlayer insulating layer **803** and the organic light emitting member **370**.

[0081] As described above, according to a method of the present invention, the light blocking member **220** made of nickel and silicon oxide is disposed below the first and second semiconductor islands **151a** and **151b**. When the first and second semiconductor islands **151a** and **151b** crystallize according to a method of the present invention, nickel is used as a seed for the crystallization of the first and second semiconductor islands **151a** and **151b**, so that the first and second semiconductor islands **151a** and **151b** crystallize faster. Therefore, total manufacturing time for the organic light emitting device is reduced.

[0082] Further, the light blocking member **220** is disposed at regions other than the regions corresponding to the pixel electrodes **191**, such that any outside light that is reflected by metal wiring, such as the pixel electrodes **191** and data conductors **171**, **172**, **175a**, **175b**, and any leakage of inside light are prevented. Accordingly, luminance of the organic light emitting device is improved and the quality of the image is correspondingly improved.

[0083] According to the method of the present invention, the crystallization speed of the semiconductor islands is improved by disposing a light blocking member formed of nickel and silicon oxide below a plurality of semiconductor islands. The manufacturing time is reduced by the faster crystallization speed.

[0084] Further, the light blocking member is disposed at regions corresponding to the pixel electrodes, so that any outside light reflected by metal wiring such as the pixel electrodes, gate conductors, and data conductors, and any

leakage of inside light, are prevented. Therefore, the contrast ratio and quality of the image of the organic light emitting device are improved.

[0085] 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 and 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 display device comprising:

a substrate;

a light blocking member formed on the substrate, wherein the light blocking member contains nickel and silicon oxide;

a semiconductor layer formed on the light blocking member;

a gate insulating layer formed on the semiconductor layer; gate conductors formed on the gate insulating layer;

a first interlayer insulating layer formed on the gate insulating layer and the gate conductors;

data conductors formed on the first interlayer insulating layer;

a second interlayer insulating layer formed on the data conductors and the first interlayer insulating layer;

a pixel electrode formed on the second interlayer insulating layer;

a third interlayer insulating layer having an opening extending to the pixel electrode;

an organic light emitting member formed inside the opening; and

a common electrode formed on the organic light emitting member and the third interlayer insulating layer.

2. The display device of claim 1, wherein proportions of nickel and silicon oxide vary with distance from the substrate.

3. The display device of claim 1, wherein the nickel concentration in the light blocking member increases closer to the substrate.

4. The display device of claim 1, wherein the silicon oxide concentration in the light blocking member decreases closer to the substrate.

5. The display device of claim 1, wherein the light blocking member includes a transmissive portion that is covered by the pixel electrode.

6. The display device of claim 1, wherein the semiconductor is a polysilicon.

7. A method of manufacturing a display device, the method comprising:

forming a light blocking member on a substrate by co-sputtering nickel and silicon oxide;

forming a semiconductor layer on the light blocking member;

forming a gate insulating layer on the semiconductor layer and the light blocking member;

forming gate conductors on the gate insulating layer;

forming a first insulating layer on the gate conductors and the gate insulating layer;

forming data conductors on the first insulating layer;

forming a second insulating layer on the data conductors and the first insulating layer;

forming a pixel electrode on the second insulating layer;

forming a third insulating layer having an opening that extends to the pixel electrode;

forming an organic light emitting member in the opening;
and
forming the organic light emitting member and the third insulating layer.

8. The method of claim 7, wherein forming the light blocking member comprises forming a transmissive portion that is covered by the pixel electrode.

9. The method of claim 7, wherein the semiconductor layer comprises polysilicon.

10. A display device comprising:

a substrate;

a light blocking member formed on the substrate, the light blocking member containing nickel and silicon oxide;

a semiconductor layer formed on the light blocking member;

a gate insulating layer formed on the semiconductor layer;
control electrodes formed on the gate insulating layer;

a first interlayer insulating layer formed on the control electrodes and the gate insulating layer, and having contact holes;

input electrodes and output electrodes formed on the first interlayer insulating layer, electrically connected with the semiconductor layer through the contact holes, and separated from each other by the control electrodes;
a second interlayer insulating layer formed on the input electrodes, the output electrodes, and the first interlayer insulating layer; and
pixel electrodes formed on the second interlayer insulating layer.

11. The display device of claim 10, wherein proportions of nickel and silicon oxide vary with distance from the substrate.

12. The display device of claim 10, wherein the nickel concentration increases closer to the substrate.

13. The display device of claim 10, wherein the silicon oxide concentration in the light blocking member decreases closer to the substrate.

14. The display device of claim 10, wherein the light blocking member has a transmissive portion that is disposed such that it is covered by the pixel electrode.

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专利名称(译)	具有快速结晶的光阻挡层的显示装置及其制造方法		
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摘要(译)

提出了一种需要较少制造时间的显示装置。显示装置包括形成在基板上的光阻挡构件，形成在光阻挡构件上的半导体层，以及形成在半导体层上的栅极绝缘层。形成栅极导体，第一层间绝缘层，数据导体，第二层间绝缘层和像素电极。沉积第三层间绝缘层，其具有延伸到像素电极的开口。在开口中形成有机发光构件，并形成公共电极。光阻挡构件包含镍和氧化硅。在半导体下方存在镍 - 和 - 氧化硅光阻挡构件改善了半导体层的结晶速度，减少了整个制造时间。此外，光阻挡构件设置在像素电极下方以防止漏光，提高对比度和图像质量。

