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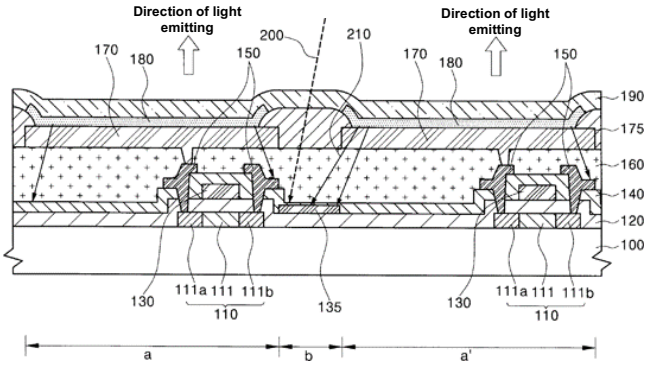
(54) ORGANIC LIGHT EMITTING DIODE DISPLAY

(57) ABSTRACT

The present disclosure provides an organic light emitting diode display including a substrate including a pixel region and a wiring region, a semiconductor layer formed on the pixel region of the substrate including a source/drain region, a gate insulation layer formed in the pixel region and the wiring region on the semiconductor layer, a gate electrode formed in the pixel region of the gate insulation layer and overlapping the semiconductor layer, a light-blocking film formed on the entire surface of the wiring region on the same layer as the gate electrode, an inter insulation layer formed in the pixel region and the wiring region on the gate electrode, and a source/drain electrode formed in the pixel region on the inter insulation layer and connected to the source/drain region.

The light-blocking film can stop external light, or light emitted from an adjacent pixel region from entering to the semiconductor layer due to diffraction and scattering to reduce the photocurrent leakage of the semiconductor layer, allowing the thin film transistor to secure stable driving properties.

MAIN DRAWING



WHAT IS CLAIMED IS:

1.

An organic light emitting diode display, comprising:

a substrate including a wiring region positioned between a pixel region and an adjacent pixel region;

a semiconductor layer formed on the pixel region of the substrate including a source/drain region;

a gate insulation layer formed in the pixel region and the wiring region on the semiconductor layer;

a gate electrode formed in the pixel region of the gate insulation layer and configured to overlap the semiconductor layer;

a light-blocking film formed on the entire surface of the wiring region on the same layer as the gate electrode;

an inter insulation layer formed in the pixel region and the wiring region on the gate electrode; and

a source/drain electrode formed in the pixel region on the inter insulation layer and connected to the source/drain region.

2.

The organic light emitting diode display of claim 1, wherein the light-blocking film is formed of a gate electrode forming material.

3.

Removed

4.

The organic light emitting diode display of claim 1, wherein the pixel region includes a thin film transistor and an organic light emitting diode.

APPLICATION

DETAILED DESCRIPTION OF THE EMBODIMENTS

PURPOSE OF THE INVENTION

TECHNICAL FIELD AND THE RELATED ART THEREOF

<9> The present disclosure relates to an organic light emitting diode display, and more particularly, to an organic light emitting diode display including a light-blocking film that blocks interference caused by external light and light between adjacent pixels.

<10> In general, the organic light emitting diode display is a self-luminous display device that electrically excites a luminescent organic compound to emit light. It is divided into a passive matrix display or an active matrix display depending on the method of driving the pixels arranged in a matrix form. The active matrix organic light emitting diode display includes a thin film transistor and has lower power consumption than the passive matrix organic light emitting diode display, so it is suitable for display enlargement.

<11> In general, the active matrix organic light emitting diode display defines a unit pixel region by signal lines arranged. The signal lines include data lines arranged in one direction, common power lines positioned at a certain interval on a metal film and parallel to the data lines, and scanning lines intersecting the metal film and the common power lines.

<12> FIG. 1 is a partial cross-sectional view of an organic light emitting diode display in the related art.

<13> Referring to FIG. 1, a pixel region (a) consisting of a thin film transistor and an organic light emitting diode and a wiring region (b) between the pixel region (a) and an adjacent pixel region (a') are arranged on a substrate (100) in a matrix form to provide an organic light emitting diode display with a large screen size. In the pixel region (a), an organic light emitting diode is formed including a semiconductor layer (110), a gate insulation film (120) formed on the semiconductor layer (110), a gate electrode (130) formed on the gate insulation film (120) and overlapping the semiconductor layer (110), an inter insulation layer (140) formed on the gate electrode (130), a thin film transistor including a source/drain electrode (150) connected to source/drain regions (111a, 111b) of the semiconductor layer

(110) through a contact hole penetrating the gate insulation layer (130) and the inter insulation layer (140), and an organic film layer (180) having a light emitting layer between a pixel electrode (170) and a counter electrode (190).

<14> The wiring region (b) may include data lines arranged in one direction, and common power lines positioned parallel to the data lines at a certain interval.

<15> At this time, external light (200), or light emitted from the adjacent pixel region (a') that does not go straight to the upper surface due to diffraction and scattering (210) is received to the semiconductor layer (110) of the pixel region (a), which generates a photocurrent in the semiconductor layer (110), and thus making it difficult to change the driving properties of the thin film transistor.

PROBLEMS TO BE SOLVED

<16> Therefore, the present disclosure provides an organic light emitting diode display in which a light-blocking film made of the same material as a gate electrode is formed on a wiring region to block light introduce to a semiconductor layer.

CONFIGURATION OF THE INVENTION

<17> An organic light emitting diode display may include a substrate including a pixel region and a wiring region,

<18> a semiconductor layer formed on the pixel region of the substrate including a source/drain region,

<19> a gate insulation layer formed in the pixel region and the wiring region on the semiconductor layer,

<20> a gate electrode formed in the pixel region of the gate insulation layer and overlapping the semiconductor layer,

<21> a light-blocking film formed on the entire surface of the wiring region on the same layer as the gate electrode,

<22> an inter insulation layer formed in the pixel region and the wiring region on the gate electrode, and

<23> a source/drain electrode formed in the pixel region on the inter insulation layer and connected to the source/drain region.

<24> The present disclosure and methods of accomplishing the same may be understood more readily by reference to the following detailed description of embodiments and the accompanying drawings.

<25> FIG. 2 is a partial cross-sectional view of an organic light emitting diode display according to an exemplary embodiment of the present disclosure.

<26> Referring to FIG. 2, a pixel region (a) consisting of a thin film transistor and an organic light emitting diode and a wiring region (b) between the pixel region (a) and an adjacent pixel region (a') are arranged on a substrate (100) in a matrix form to provide an organic light emitting diode display with a large screen size.

<27> The substrate (100) is formed of an insulating material made of glass or plastic, and a buffer layer (not shown) may be formed on the entire upper surface of the substrate (100) including the pixel region (a) and the wiring region (b). The buffer layer (not shown) prevents the diffusion of moisture or impurities generated in the substrate (100) or controls heat transfer during crystallization, thereby ensuring excellent crystallization of the semiconductor layer (110).

<28> Next, an amorphous silicon layer is formed on the buffer layer (not shown) of the pixel region (a). It is preferable that the amorphous silicon layer is formed into a polycrystalline silicon layer by crystallization methods such as excimer laser annealing (ELA), sequential lateral solidification (SLS), metal induced crystallization (MIC), or metal induced later crystallization (MILC).

<29> The amorphous silicon layer may be formed using chemical vapor deposition or physical vapor deposition, and dehydrogenation may be performed to lower the hydrogen concentration during or after forming the amorphous silicon layer.

<30> Next, a gate insulation layer (120) is formed on the entire upper surface of the substrate including the pixel region (a) and the wiring region (b). A gate electrode (130) of a certain pattern is formed using MoW, Al/Cu, etc. in the pixel region (a) on the gate insulation film (120), and at the same time, in the wiring region (b), a light-blocking film (115) is formed using the same material as the gate electrode (130) on the entire upper surface of the gate insulation film (120).

<31> In the pixel region (a), ion implantation is performed using the gate electrode (130) as a mask to form a source/drain region (111a, 111b) and a channel region (111) on the semiconductor layer (110). An inter insulation layer (140) is formed on the entire upper surface of the substrate including the pixel region (a) and the wiring region (b). The inter insulation layer (140) protects elements formed thereunder or provides electrical insulation.

<32> Meanwhile, the buffer layer (not shown), the gate insulation layer (120), and the inter insulation layer (140) may be formed of SiO2 or SiNx, and may be formed of multiple layers thereof.

<33> In the pixel region (a), a contact hole is formed to expose the source/drain region (111a, 111b) of the semiconductor layer (110) through the inter insulation layer (140) and the gate insulation layer (120), and a source/drain electrode (150) of a certain pattern connected to the contact hole is formed on the inter insulation layer (140).

<34> On the entire upper surface of the substrate including the pixel region (a) and the wiring region (b), a protection layer (160) made of SiO2 or SiNx, and multiple layers thereof is formed. At this time, a planarization layer (not shown) made of an organic material may be provided to alleviate the steps on the substrate.

<35> A pixel electrode (170) electrically connected to one of the source/drain electrodes (150) is formed through a via hole penetrating the protection film (160) in the pixel region (a). The pixel electrode (170) may have a structure in which a transparent electrode of indium tin oxide (ITO) or indium zinc oxide (IZO) is laminated on a reflective electrode made of one of the group consisting of Pt, Au, Ir, Cr, Mg, Ag, Al, and alloys thereof.

<36> In the pixel region (a), a pixel defining layer (175) having an opening that exposes a part of the pixel electrode (170) is formed. The pixel defining layer (175) may be a material selected from the group consisting of benzocyclobutene (BCB), acrylic polymer. and polyimide.

<37> An organic film layer (180) is formed including an organic light-emitting layer on the pixel electrode (170) exposed through the opening of the pixel region (a), and then a counter electrode (190) is formed on the entire upper surface of the substrate that includes the pixel region (a) and the wiring region (b).

<38> The light-blocking film (115) formed in the wiring region (b) prevents external light (200), or light emitted from the adjacent pixel region (a') that does not go straight to the upper surface due to diffraction and scattering (210) from entering to the semiconductor layer (110) of the pixel region (a).

<39> Even in the case of a bottom-emission organic light emitting diode, in the same way, the organic light emitting diode display may prevent light from being received by the semiconductor layer (110) by forming a light-blocking film (135) in the wiring region (b).

<40> While the 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 arrangements within the spirit and scope of the invention by those skilled in the art.

EFFECT

<41> According to the organic light emitting diode display of the present disclosure, the light-blocking film made of the gate electrode may be formed in the wiring region, thereby preventing external light or light emitted from an adjacent pixel region from being received by the semiconductor layer, and allowing the thin film transistor to secure stable driving properties.

BRIEF DESCRIPTION OF THE DRAWINGS

<1> FIG. 1 is a partial cross-sectional view of an organic light emitting diode display in the related art.

<2> FIG. 2 is a partial cross-sectional view of an organic light emitting diode display according to an exemplary embodiment of the present disclosure.

<3> <MAIN NUMERALS IN THE DRAWINGS>

<4> 100: Substrate 110: Semiconductor layer

<5> 111a, 111b: Source/drain region 115: Light-blocking film

<6> 120: Gate insulation layer 130: Gate electrode

<7> 135: Light-blocking film 140: Inter insulation layer

<8> 150: Source/drain electrode

DRAWINGS

FIG. 1

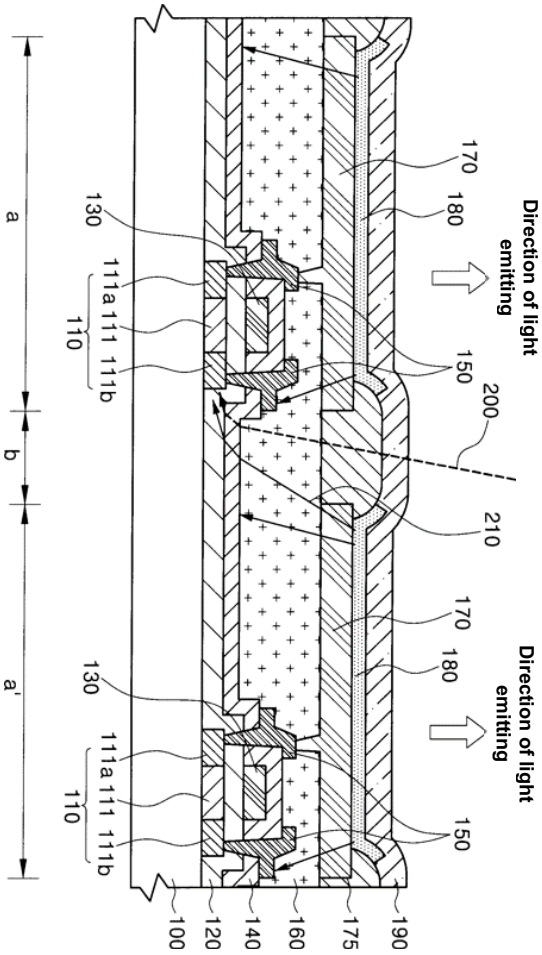
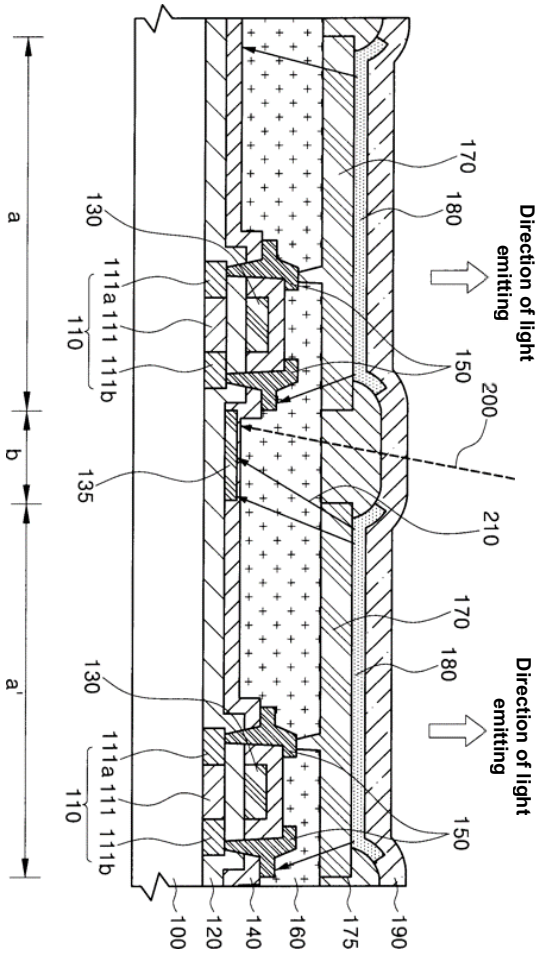


FIG. 2


a
b
a'
130
111a
111
111b
110
135
170
180
150
200
210
Direction of light emitting
Direction of light emitting
100
120
140
160
175
190

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TRANSLATION CERTIFICATION

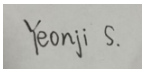
Date: December 9, 2024

To whom it may concern:

I, Yeonji S., a translator fluent in the Korean and English languages, on behalf of Morningside, do solemnly and sincerely declare that the following is, to the best of my knowledge and belief, a true and correct translation of the document listed below in a form that best reflects the intention and meaning of the original text.

The document is designated as:

- KR100853543B1



Signature

Yeonji S.

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