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(54) **ORGANIC LIGHT EMITTING DIODE DISPLAY AND METHOD FOR MANUFACTURING THE SAME**

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(57) **ABSTRACT**

An organic light emitting diode display includes a substrate; an organic light emitting element provided over the substrate; a thin film encapsulation layer configured to seal the organic light emitting element together with the substrate; a phase delay layer provided over the thin film encapsulation layer and contacting the thin film encapsulation layer; and a polarizing film attached to the phase delay layer and having an area smaller than that of the phase delay layer.

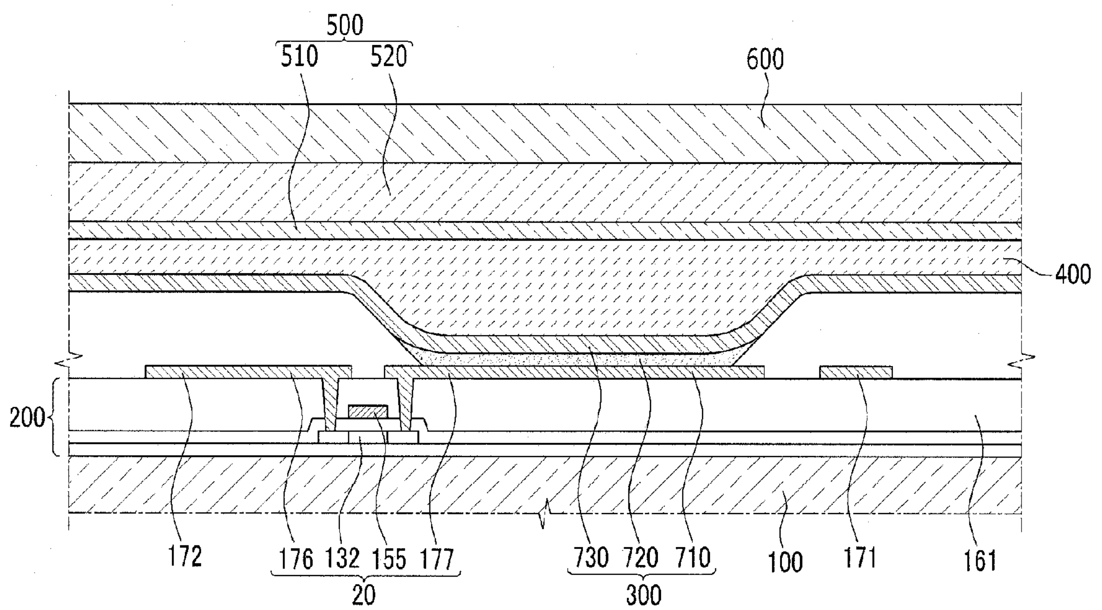


FIG. 1

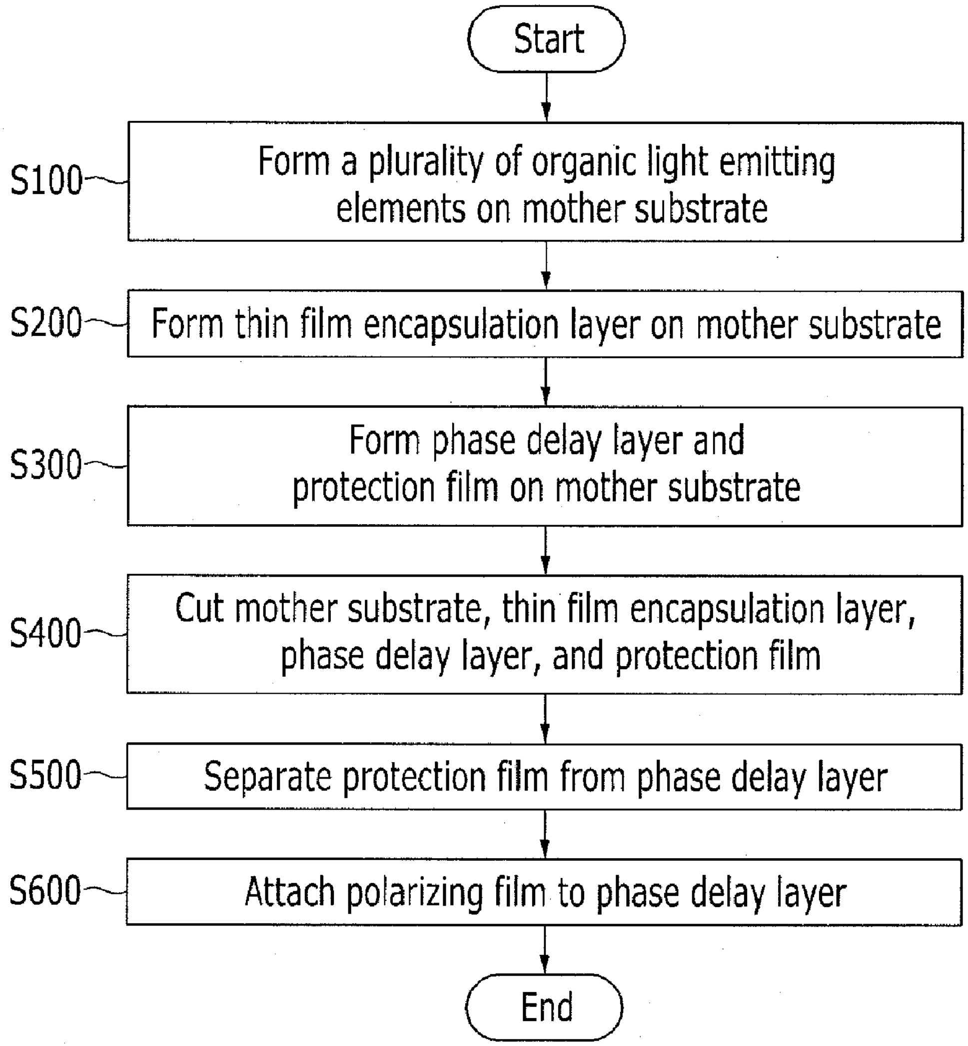

Start
S100
Form a plurality of organic light emitting elements on mother substrate
S200
Form thin film encapsulation layer on mother substrate
S300
Form phase delay layer and protection film on mother substrate
S400
Cut mother substrate, thin film encapsulation layer, phase delay layer, and protection film
S500
Separate protection film from phase delay layer
S600
Attach polarizing film to phase delay layer
End

FIG. 2

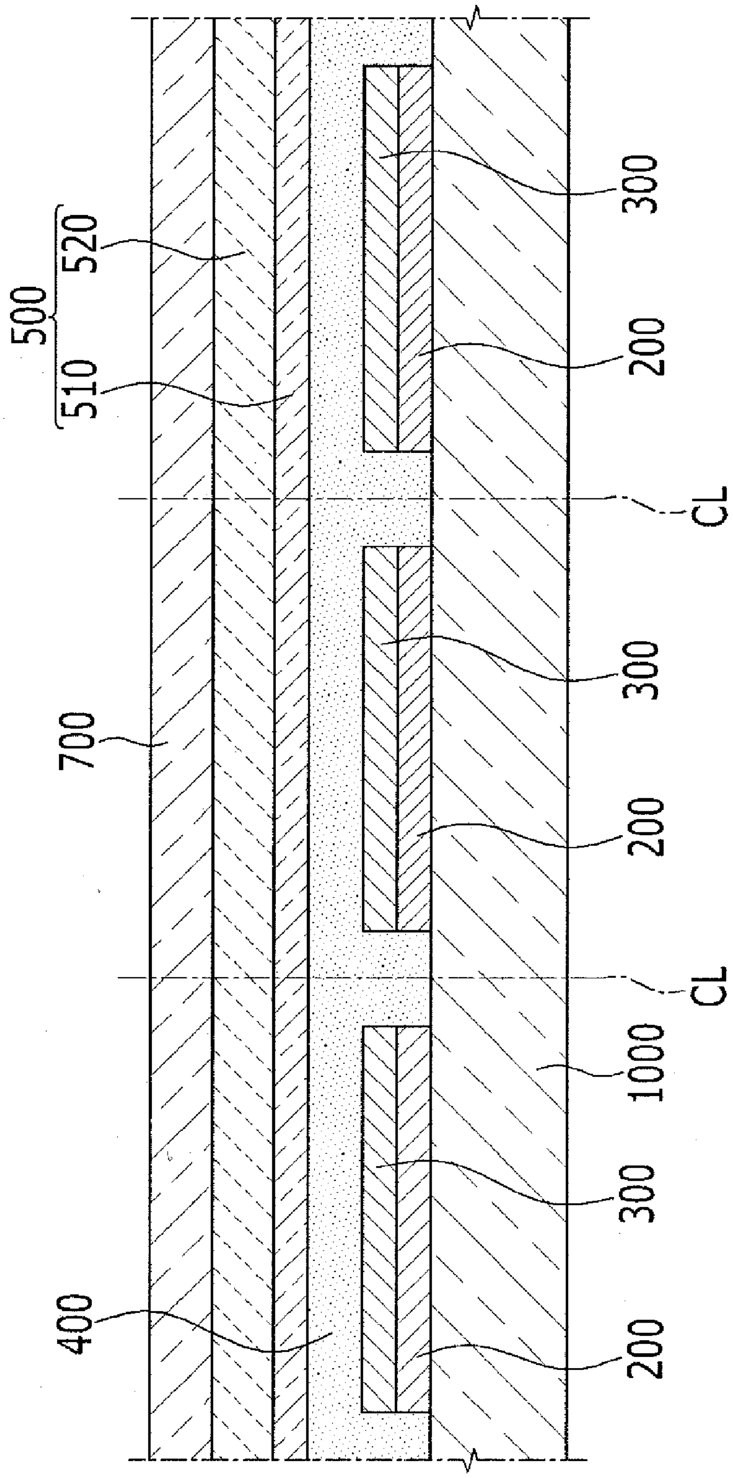


FIG. 3

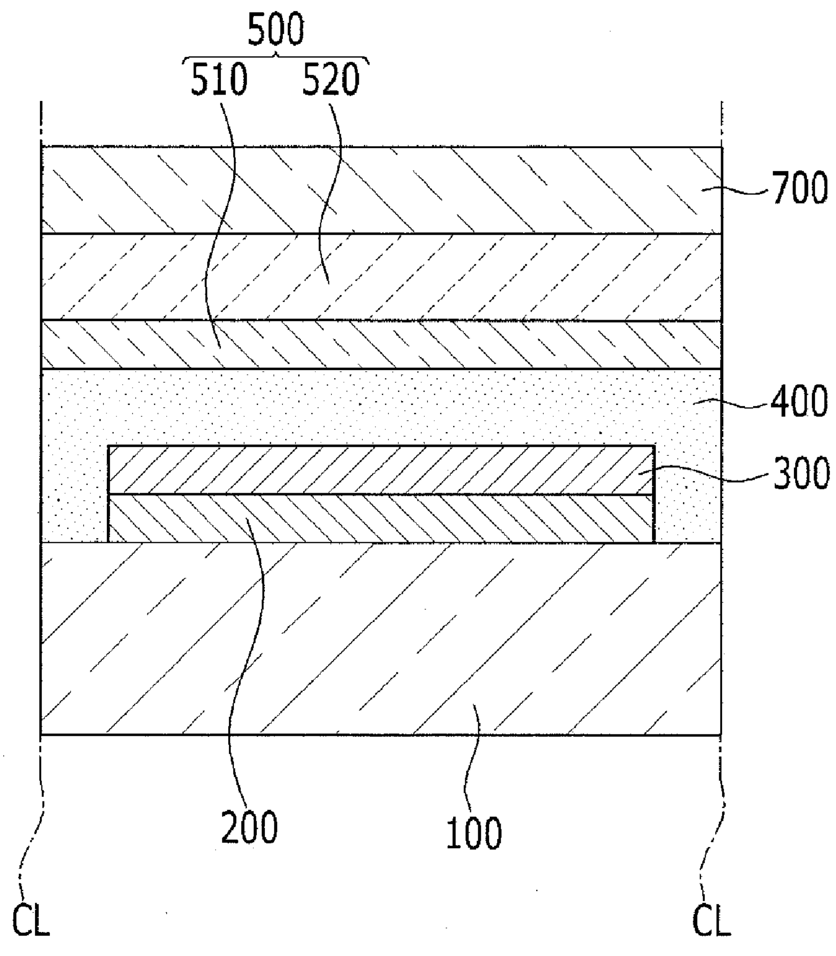


FIG. 4

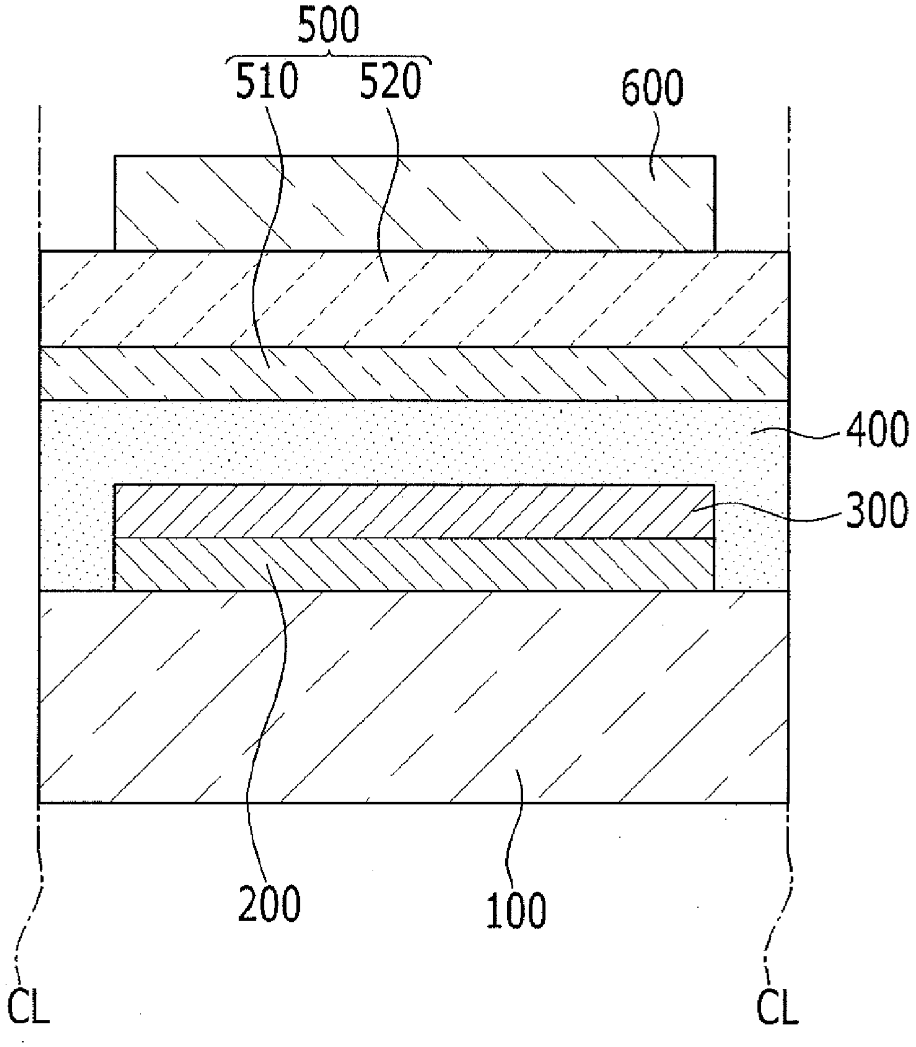


FIG. 5

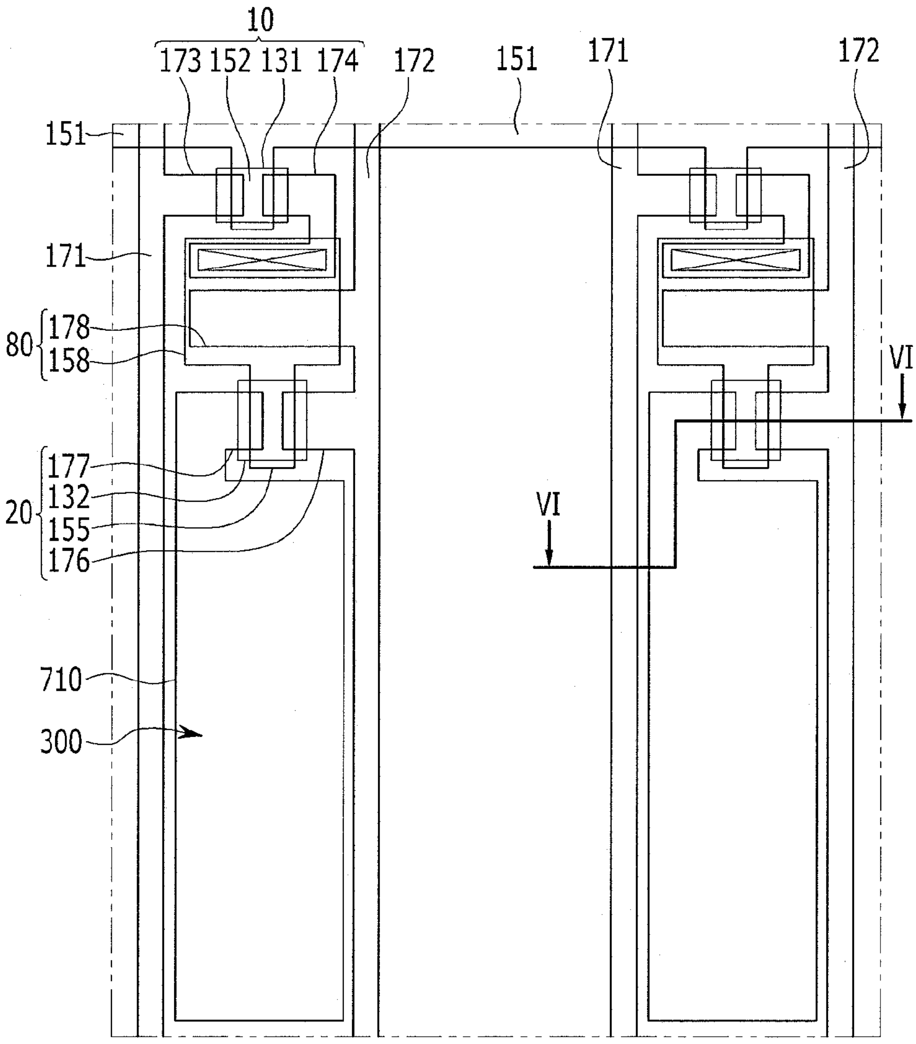
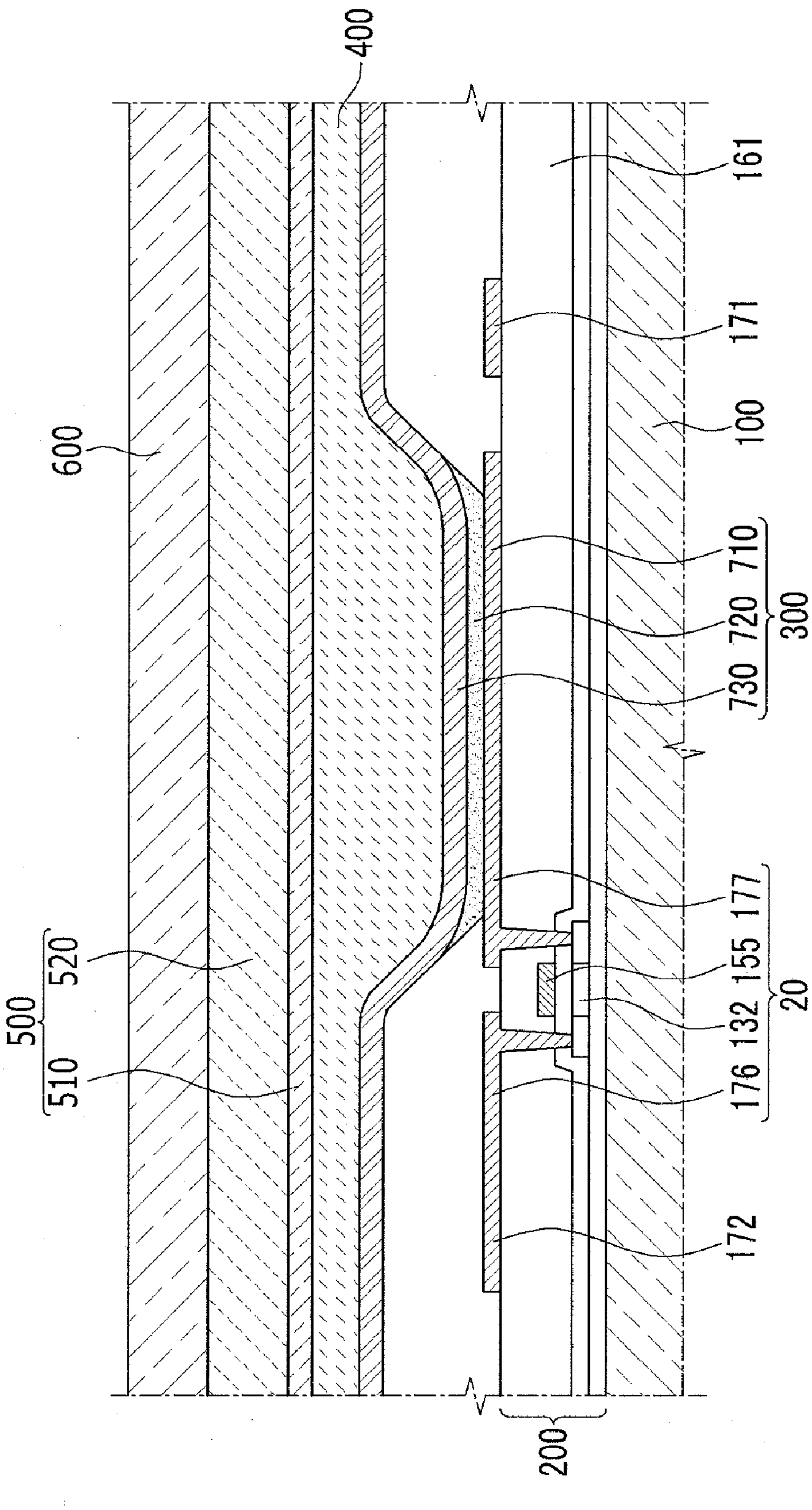

10
173 152 131 174
172
151
171
172
151
171
80
178
158
VI
VI
20
177
132
155
176
710
300

FIG. 6


400
600
161
171
100
710
720
300
730
177
155
132
20
176
172
520
500
510
200

ORGANIC LIGHT EMITTING DIODE DISPLAY AND METHOD FOR MANUFACTURING THE SAME

RELATED APPLICATIONS

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2011-0037944 filed in the Korean Intellectual Property Office on Apr. 22, 2011, the entire contents of which are incorporated herein by reference.

BACKGROUND

[0002] 1. Field

[0003] The present disclosure relates generally to an organic light emitting diode (OLED) display and a method for manufacturing an organic light emitting diode (OLED) display. More particularly, the present disclosure relates generally to an organic light emitting diode (OLED) display using a thin film encapsulation layer as an encapsulation member and a method for manufacturing an organic light emitting diode (OLED) display.

[0004] 2. Description of the Related Art

[0005] Organic light emitting diode display that display images have been in the spotlight.

[0006] The organic light emitting diode displays have self-emitting characteristics and do not need a separate light source such that the thickness and weight thereof are decreased, and are distinguished from a liquid crystal display in this aspect. In addition, the organic light emitting diode displays have high-grade characteristics such as low power consumption, high luminance, high reaction speed, and the like.

[0007] In general, an OLED display includes a substrate, an organic light emitting diode disposed on the substrate and displaying an image, and an encapsulation member facing the substrate while interposing the organic light emitting diode therebetween to encapsulate the organic light emitting diode.

[0008] In an OLED display, a thin film encapsulation layer can be used as an encapsulation member.

[0009] In an organic light emitting diode (OLED) display, a polarizing film is attached to the thin film encapsulation layer so as to improve an image displayed by the organic light emitting element. However, when the polarizing film is detached from the thin film encapsulation layer so as to solve the problem of the bonded state of the polarizing film to the organic light emitting diode (OLED) display, adherence of the polarizing film may cause damages to the surface of the thin film encapsulation layer.

[0010] The above information disclosed in this Background section is only for enhancement of understanding of the background of the described technology 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

[0011] An aspect provides an organic light emitting diode (OLED) display for minimizing generation of damages to the surface of a thin film encapsulation layer when a polarizing film attached to the thin film encapsulation layer is reprocessed while including the thin film encapsulation layer for sealing the organic light emitting element.

[0012] An embodiment provides an organic light emitting diode display including: a substrate; an organic light emitting element provided over the substrate; a thin film encapsulation layer configured to seal the organic light emitting element together with the substrate; a phase delay layer provided over the thin film encapsulation layer and contacting the thin film encapsulation layer; and a polarizing film attached to the phase delay layer and having an area smaller than that of the phase delay layer.

[0013] Each of the phase delay layer, the substrate, and the thin film encapsulation layer comprises a side, and the sides of the phase delay layer, the substrate, and the thin film encapsulation are placed in the same plane.

[0014] Each of the phase delay layer, the substrate, and the thin film encapsulation layer comprises a side having an angle with respect to a plane, and the angle of the substrate, the angle of the thin film encapsulation layer, and the angle of the phase delay layer are the same.

[0015] The phase delay layer includes an adhesive layer contacting the thin film encapsulation layer, and a phase delay film provided over the thin film encapsulation layer with the adhesive layer therebetween.

[0016] Another embodiment provides a method for manufacturing an organic light emitting diode display, the method including: forming a plurality of organic light emitting elements distanced from each other over a mother substrate; forming a thin film encapsulation layer over the mother substrate so as to encapsulate the plurality of organic light emitting elements together with the mother substrate; forming, over the thin film encapsulation layer, a phase delay layer contacting the thin film encapsulation layer and a protection film attached to the phase delay layer; cutting the mother substrate, the thin film encapsulation layer, the phase delay layer, and the protection film at a region between two immediately neighboring organic light emitting elements among the plurality of organic light emitting elements into a plurality of unfinished organic light emitting diode displays; separating the protection film from the phase delay layer of a first one of the plurality of unfinished organic light emitting diode displays; and attaching a polarizing film to the phase delay layer of the first unfinished organic light emitting diode display wherein the polarizing film has an area smaller than that of the phase delay layer of the first unfinished organic light emitting diode display.

[0017] The mother substrate, the thin film encapsulation layer, the phase delay layer, and the protection film are cut by using a single cutting process.

[0018] The phase delay layer includes an adhesive layer and a phase delay film attached to the adhesive layer, and the forming of a phase delay layer and a protection film is performed by adhering the phase delay layer using the adhesive layer to the thin film encapsulation layer while the protection film is attached to the phase delay film.

[0019] According to the embodiments, an organic light emitting diode (OLED) display for minimizing generation of damages to the surface of the thin film encapsulation layer when the polarizing film attached to the thin film encapsulation layer is reprocessed while including the thin film encapsulation layer for sealing the organic light emitting element is provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. **1** shows a flowchart of a method for manufacturing an organic light emitting diode (OLED) display according to a first embodiment.

[0021] FIG. **2** to FIG. **4** provide illustrations for showing a method for manufacturing an organic light emitting diode (OLED) display according to a first embodiment.

[0022] FIG. **4** shows a cross-sectional view of an organic light emitting diode (OLED) display according to a second embodiment.

[0023] FIG. **5** shows a layout view of a pixel of an organic light emitting diode (OLED) display according to a second embodiment.

[0024] FIG. **6** shows a cross-sectional view with respect to a line VI-VI of FIG. **5**.

DETAILED DESCRIPTION

[0025] Embodiments of the present invention will be described more fully hereinafter with reference to the accompanying drawings, in which 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.

[0026] The drawings and description are to be regarded as illustrative in nature and not restrictive. Like reference numerals designate like elements throughout the specification.

[0027] Further, since sizes and thicknesses of constituent members shown in the accompanying drawings are arbitrarily given for better understanding and ease of description, the present invention is not limited to the illustrated sizes and thicknesses.

[0028] In the drawings, the thickness of layers, films, panels, regions, etc., may be exaggerated for clarity. In the drawings, for better understanding and ease of description, the thicknesses of some layers and areas may be exaggerated. 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.

[0029] In addition, unless explicitly described to the contrary, the word "comprise" and variations such as "comprises" or "comprising" will be understood to imply the inclusion of stated elements but not the exclusion of any other elements. In addition, "~on" is either positioned on or below a portion of a target or positioned on the upper side based on a gravity direction, throughout the specification.

[0030] A method for manufacturing an organic light emitting diode (OLED) display according to a first embodiment will now be described with reference to FIG. **1** to FIG. **4**.

[0031] FIG. **1** shows a flowchart of a method for manufacturing an organic light emitting diode (OLED) display according to a first embodiment. FIG. **2** to FIG. **4** show a method for manufacturing an organic light emitting diode (OLED) display according to a first embodiment.

[0032] As shown in FIG. **1** and FIG. **2**, a plurality of organic light emitting elements **300** are formed on a mother substrate **1000** (S**100**).

[0033] In embodiments, a plurality of wires **200** that are distanced from each other and a plurality of organic light emitting elements **300** that are distanced from each other are formed on the flexible mother substrate **1000**. The mother substrate **1000** can include glass, resin, or metal and be made of a light transmissive, light reflective, light absorptive, or semitransparent material. The detailed configuration of the wires **200** and the organic light emitting elements **300** will be described with reference to the organic light emitting diode (OLED) display according to a second embodiment.

[0034] A thin film encapsulation layer **400** is formed on the mother substrate **1000** (S**200**).

[0035] In embodiments, the thin film encapsulation layer **400** is formed on the mother substrate **1000** so as to cover the mother substrate **1000** and the organic light emitting elements **300**. The thin film encapsulation layer **400** can be formed by alternately stacking at least one organic layer and at least one inorganic layer. In embodiments, the organic layer can be a single layer or a stacked layers which include polyethylene terephthalate (PET), polyimide (PI), or polycarbonate (PC), or it can be a single layer or a stacked layer including engineering plastic including at least one of glass fiber reinforced plastic (FRP), polyethylene terephthalate (PET), and polymethylmethacrylate (PMMA), and the inorganic layer can be a single layer or a stacked layer including at least one of aluminum oxide and silicon oxynitride such as silicon oxide (SiOx), silicon nitride (SiNx), titanium oxide (TiOx), or alumina (Al_2O_3). A highest sublayer of the thin film encapsulation layer **400** that is exposed to the outside can be formed with an inorganic layer to prevent permeation of moisture into the organic light emitting element **300**.

[0036] A phase delay layer **500** and a protection film **700** are formed on the thin film encapsulation layer **400** (S**300**).

[0037] In embodiments, the phase delay layer **500** includes an adhesive layer **510** and a phase delay film **520** adhered to the adhesive layer **510**. The protection film **700** is adhered to the phase delay film **520**. The adhesive layer **510** is adhered to the thin film encapsulation layer **400** to form the phase delay layer **500** and the protection film **700** in the thin film encapsulation layer **400**. Resultantly, while the protection film **700** is attached to the phase delay layer **500**, the phase delay layer **500** contacts the thin film encapsulation layer **400**. The phase delay layer **500** may have a phase difference axis of $\lambda/4$, and may delay the phase of light passing through the phase delay layer **500** by $\lambda/4$ to change the optical axis of the light. The protection film **700** protects the phase delay layer **500** and the thin film encapsulation layer **400** from outer interference. The protection film **700** is exposed to the outside while being attached to the phase delay layer **500** to thus suppress the phase delay layer **500** and the thin film encapsulation layer **400** from being damaged by interference that occurs during a subsequent process.

[0038] Accordingly, the phase delay layer **500** and the protection film **700** are formed over the thin film encapsulation layer **400** by using the adhesive layer **510** of the phase delay layer **500** while the protection film **700** is attached to the phase delay film **520** of the phase delay layer **500**. Thus, the phase delay layer **500** and the adhesive layer **510** can be formed on the thin film encapsulation layer **400** by a single adhering process. This allows reducing of the time and cost for manufacturing the organic light emitting diode (OLED) display. Thus, the method for manufacturing the organic light emitting diode (OLED) display according to the first embodiment leads the reduction of the time and cost for manufacturing the organic light emitting diode (OLED) display is provided.

[0039] In the method for manufacturing the organic light emitting diode (OLED) display according to the first embodiment, the phase delay layer **500** is formed over the thin film encapsulation layer **400** by the adhering process using the adhesive layer **510** included in the phase delay layer **500**. In the method for manufacturing the organic light emitting diode

(OLED) display according to an alternative embodiment, the phase delay layer is formed on the thin film encapsulation layer **400** by a coating or sputtering process. In this case, after the phase delay layer is formed in the thin film encapsulation layer **400**, the protection film **700** is attached to the phase delay layer to form the phase delay layer and the protection film **700** over the thin film encapsulation layer **400**.

[0040] As shown in FIG. **3**, the mother substrate **1000**, the thin film encapsulation layer **400**, the phase delay layer **500**, and the protection film **700** are cut (S**400**).

[0041] In embodiments, the mother substrate **1000**, the thin film encapsulation layer **400**, the phase delay layer **500**, and the protection film **700** are cut along a virtual cutting line (CL) provided between two immediately neighboring organic light emitting elements **300** among the plurality of organic light emitting elements **300** by performing a single cutting process using a cutting means such as a laser or diamond cutter. Thus, side surfaces of the substrate **100** that is cut from the mother substrate **1000**, the thin film encapsulation layer **400**, the phase delay layer **500**, and the protection film **700** are provided at the virtual cutting line (CL). In embodiments, the substrate **100**, the thin film encapsulation layer **400**, the phase delay layer **500**, and the protection film **700** are cut by a single cutting process so a cutting angle of a cross-section of the substrate **100** corresponding to the end of the substrate **100**, a cutting angle of a cross-section of the thin film encapsulation layer **400** corresponding to the end of the thin film encapsulation layer **400**, and a cutting angle of a cross-section of the phase delay layer **500** corresponding to the end of the phase delay layer **500** can be the same.

[0042] As shown in FIG. **4**, the protection film **700** is separated from the phase delay layer **500** (S**500**).

[0043] In embodiments, after various processes, such as, a heat treatment process that is performed after the cutting process is finished are performed, the protection film **700** is separated from the phase delay layer **500**.

[0044] A polarizing film **600** is attached to the phase delay layer **500** (S**600**).

[0045] In embodiments, a polarizing film **600** that is smaller than the phase delay layer **500** is attached to the phase delay layer **500**. The polarizing film **600** has a smaller area than that of the phase delay layer **500** because the phase delay layer **500** and the polarizing film **600** are formed over the thin film encapsulation layer **400** by different processes. The polarizing film **600** can linearly polarize the light passing through the polarizing film **600**. The polarizing film **600** controls reflection of outer light incident to the organic light emitting element **300** from the outside together with the phase delay layer **500** to improve the image displayed by the organic light emitting element **300**.

[0046] According to the above-described process, an organic light emitting diode (OLED) display to be described according to a second embodiment will be manufactured.

[0047] During the attaching process of the polarizing film **600** to the phase delay layer **500**, the attached state of the polarizing film **600** to the phase delay layer **500** may be bad. When the polarizing film **600** is detached from the phase delay layer **500** so as to solve the bad state of attachment of the polarizing film **600**, the surface of the thin film encapsulation layer **400** is protected from damages due to adherence of the polarizing film **600** as the polarizing film **600** does not directly contact the thin film encapsulation layer **400** but is attached to the phase delay layer **500**.

[0048] Particularly, an inorganic layer having a better waterproofing property than the organic layer is provided in the highest sublayer of the thin film encapsulation layer **400** so as to waterproof the organic light emitting element **300**. However, the inorganic layer has brittleness of a ceramic material. Thus, when an optical film such as the polarizing film **600** is attached to the inorganic layer, the inorganic layer may be broken by the adherence of the polarizing film **600** when detaching the polarizing film from the thin film encapsulation layer **400**. Thus, in embodiments, the phase delay layer **500** is disposed between the polarizing film **600** and the thin film encapsulation layer **400** in consideration of the brittleness of the inorganic layer provided in the highest layer of the thin film encapsulation layer **400**. In other words, the phase delay layer **500** is attached to the thin film encapsulation layer **400** together with the protection film **700** and the polarizing film **600** is then attached to the phase delay layer **500** rather than attaching the polarizing film **600** to the encapsulation layer **400**. Thus, when the polarizing film **600** is detached from the phase delay layer **500**, generation of damages to the inorganic layer exposed on the surface of the thin film encapsulation layer **400** by the adherence of the polarizing film **600** is avoided.

[0049] Also, regarding the method for manufacturing an organic light emitting diode (OLED) display according to the first embodiment, the protection film **700** is attached to the phase delay layer **500** in order to avoid a rupture of the thin film encapsulation layer **400** caused by external interference during the manufacturing process. Thus, when the protection film **700** is separated from the phase delay layer **500** so as to attach the polarizing film **600** thereto, damages to the thin film encapsulation layer **400** due to adherence of the protection film **700** are minimized as the protection film **700** is attached to the phase delay layer **500**.

[0050] Accordingly, the phase delay layer **500** is formed on the thin film encapsulation layer **400** to prevent the thin film encapsulation layer **400** from being damaged by the adherence of the protection film **700** or the polarizing film **600**, and thus, the yield and reliability for the manufacturing process is improved.

[0051] An organic light emitting diode (OLED) display according to a second embodiment will now be described with reference to FIG. **4** to FIG. **6**.

[0052] FIG. **4** shows a cross-sectional view of an organic light emitting diode (OLED) display according to a second embodiment.

[0053] As shown in FIG. **4**, the organic light emitting diode (OLED) display includes a substrate **100**, wires **200**, an organic light emitting element **300**, a thin film encapsulation layer **400**, a phase delay layer **500**, and a polarizing film **600**.

[0054] The substrate **100** includes glass, resin, and metal, and it is made of a light transmissive, light reflective, light absorptive, or semitransparent material. The wires **200** and the organic light emitting element **300** are provided on the substrate **100**. The substrate **100** encapsulates the organic light emitting element **300** together with the thin film encapsulation layer **400** with the wires **200** and the organic light emitting element **300** therebetween. The substrate **100** and the thin film encapsulation layer **400** protect the wires **200** and the organic light emitting element **300** from external interference. The substrate **100** can be flexible, and since the thin film encapsulation layer **400** is formed to be a thin film while the substrate **100** is flexible, the organic light emitting diode (OLED) display can be flexible.

[0055] The wires **200** include first and second thin film transistors (**10** and **20** in FIG. **5**), and transmit a signal to the organic light emitting element **300** to drive the organic light emitting element **300**. The organic light emitting element **300** displays an image by emitting light according to the signal provided by the wires **200**.

[0056] The organic light emitting element **300** is provided on the wires **200**.

[0057] A configuration of the organic light emitting diode (OLED) display according to the second embodiment will now be described with reference FIG. **5** and FIG. **6**.

[0058] FIG. **5** shows a layout view of a pixel of an organic light emitting diode (OLED) display according to a second embodiment. FIG. **6** shows a cross-sectional view with respect to a line VI-VI of FIG. **5**.

[0059] While a detailed configuration of the wires **200** and the organic light emitting element **300** is shown in FIG. **5** and FIG. **6**, the embodiment is not restricted to the configuration shown in FIG. **5** and FIG. **6**. The wires **200** and the organic light emitting element **300** can be formed with various configurations within the range that is easily modifiable by a person skilled in the art. For example, in the drawing, an active matrix (AM) type of organic light emitting diode (OLED) display in the 2Tr-1 Cap structure including two thin film transistors (TFT) and a single capacitor for each pixel is shown for the organic light emitting diode (OLED) display, and the present invention is not limited thereto. Therefore, the organic light emitting diode (OLED) display does not have limits of the number of the thin film transistors, the number of the capacitors, and the number of the wires. A pixel represents the minimum unit for displaying the image, and the organic light emitting diode (OLED) display displays the image by using a plurality of pixels.

[0060] As shown in FIG. **5** and FIG. **6**, the organic light emitting diode (OLED) display according to the second embodiment includes a switching thin film transistor **10**, a drive thin film transistor **20**, a capacitor **80**, and an organic light emitting element **300** for each pixel. Here, the switching thin film transistor **10**, the drive thin film transistor **20**, and the capacitor **80** configure the wires **200**. The wires **200** further include a gate line **151** disposed in one direction of the substrate **100**, a data line **171** crossing the gate line **151** in an insulated manner, and a common power line **172**. In embodiments, one pixel is defined by a boundary of the gate line **151**, the data line **171**, and the common power line **172**, and it is not limited thereto.

[0061] The organic light emitting element **300** includes a first electrode **710**, an organic emission layer **720** formed on the first electrode **710**, and a second electrode **730** formed on the organic emission layer **720**. The first electrode **710**, the organic emission layer **720**, and the second electrode **730** form the organic light emitting element **300**. Here, the first electrode **710** becomes an anode, which is a hole injection electrode, and the second electrode **730** becomes a cathode, which is an electron injection electrode. However, the embodiment is not restricted thereto, and the first electrode **710** can become a cathode and the second electrode **730** can become an anode depending on the method for driving the organic light emitting diode (OLED) display. Holes and electrons are injected into the organic emission layer **720** from the first electrode **710** and the second electrode **730**, and the organic emission layer **720** emits light when exitons generated by combination of the holes and the electrons that are injected into the organic emission layer **720** enter the ground state from the excitation state. Also, at least one of the first electrode **710** and the second electrode **730** can be formed in the light transmissive structure so the organic light emitting element **300** emits light in the direction of the thin film encapsulation layer **400** to display the image in the direction of the thin film encapsulation layer **400**.

[0062] The capacitor **80** includes a pair of capacitor plates **158** and **178** disposed with an interlayer insulating layer **161** therebetween. In embodiments, the interlayer insulating layer **161** is a dielectric material, and capacitance of the capacitor **80** is determined by the charges stored in the capacitor **80** and the voltage between the capacitor plates **158** and **178**.

[0063] The switching thin film transistor **10** includes a switching semiconductor layer **131**, a switching gate electrode **152**, a switching source electrode **173**, and a switching drain electrode **174**. The drive thin film transistor **20** includes a drive semiconductor layer **132**, a drive gate electrode **155**, a drive source electrode **176**, and a drive drain electrode **177**.

[0064] The switching thin film transistor **10** is used as a switch for selecting a pixel to emit light. The switching gate electrode **152** is connected to the gate line **151**. The switching source electrode **173** is connected to the data line **171**. The switching drain electrode **174** is distanced from the switching source electrode **173** and is connected to one (**158**) of the capacitor plates.

[0065] The drive thin film transistor **20** applies drive power for emitting the organic emission layer **720** of the organic light emitting element **300** in the selected pixel to the second electrode **730**. The drive gate electrode **155** is connected to the capacitor plate **158** connected to the switching drain electrode **174**. The drive source electrode **176** and the other capacitor plate **178** are connected to the common power line **172**. The drive drain electrode **177** is provided in the same layer as the first electrode **710** and is connected to the first electrode **710**.

[0066] The drive drain electrode **177** of the organic light emitting diode (OLED) display according to the second embodiment is provided in the same layer as the first electrode **710**, and the drive drain electrode of the organic light emitting diode (OLED) display according to another embodiment is provided in the different layer to that of the first electrode and can contact the first electrode through an opening that is formed in the insulating layer.

[0067] According to the above-described configuration, the switching thin film transistor **10** is operable by the gate voltage applied to the gate line **151** to transmit the data voltage applied to the data line **171** to the drive thin film transistor **20**. A voltage that corresponds to a difference between a common voltage applied to the drive thin film transistor **20** from the common power line **172** and the data voltage transmitted by the switching thin film transistor **10** is stored in the capacitor **80**, and a current that corresponds to the voltage stored in the capacitor **80** flows to the organic light emitting element **300** through the drive thin film transistor **20** so that the organic light emitting element **300** emits light.

[0068] Referring to FIG. **4** and FIG. **6**, a thin film encapsulation layer **400** is provided on the organic light emitting element **300**.

[0069] The thin film encapsulation layer **400** faces the substrate **100** with the organic light emitting element **300** therebetween, and covers the organic light emitting element **300** to seal the organic light emitting element **300**.

[0070] The thin film encapsulation layer **400** can be formed by alternately stacking at least one organic layer and at least one inorganic layer. Here, the organic layer can be a single layer or stacked layers which include a resin such as polyethylene terephthalate (PET), polyimide (PI), or polycarbonate (PC), or it can be a single layer or stacked layers including engineering plastic including at least one of glass fiber reinforced plastic (FRP), polyethylene terephthalate (PET), and polymethylmethacrylate (PMMA), and the inorganic layer can be a single layer or stacked layers including at least one of aluminum oxide and silicon oxynitride such as silicon oxide (SiOx), silicon nitride (SiNx), titanium oxide (TiOx), or alumina (Al_2O_3). In addition, the highest sublayer of the thin film encapsulation layer **400** that is exposed to the outside can be formed with an inorganic layer for preventing permeation of moisture into the organic light emitting element **300**.

[0071] A phase delay layer **500** is provided in the thin film encapsulation layer **400**.

[0072] The phase delay layer **500** contacts the thin film encapsulation layer **400**, and includes an adhesive layer **510** and a phase delay film **520** adhered to the adhesive layer **510**. The adhesive layer **510** supports the phase delay layer **500** to be adhered between the thin film encapsulation layer **400**, and the phase delay film **520** delays the phase of light passing through the phase delay layer **500** by λ/4 to change the optical axis of the light.

[0073] Cut sides of the substrate **100**, the thin film encapsulation layer **400**, and the phase delay layer **500** are placed in the same plane illustrated as the same cutting line (CL), and the cutting angle of the cross-section of the substrate **100** corresponding to the end of the substrate **100**, the cutting angle of the cross-section of the thin film encapsulation layer **400** corresponding to the end of the thin film encapsulation layer **400**, and the cutting angle of the cross-section of the phase delay layer **500** corresponding to the end of the phase delay layer **500** can be the same.

[0074] In the organic light emitting diode (OLED) display according to the second embodiment, the phase delay layer **500** includes the adhesive layer **510** and the phase delay film **520**. In the organic light emitting diode (OLED) display according to another embodiment, the phase delay layer can be formed on the thin film encapsulation layer **400** by a coating or sputtering process to thus form a single layer.

[0075] A polarizing film **600** is provided in the phase delay layer **500**.

[0076] The polarizing film **600** is smaller than the phase delay layer **500**, and it is attached to the phase delay layer **500**. The polarizing film **600** linearly polarizes the light passing through the polarizing film **600**, and suppresses reflection of the external light irradiated to the organic light emitting element **300** from the outside together with the phase delay layer **500** to improve the image displayed by the organic light emitting element **300**.

[0077] Accordingly, organic light emitting diode (OLED) display according to the second embodiment is manufactured by the method for manufacturing the organic light emitting diode (OLED) display according to the first embodiment, so generation of damage to the thin film encapsulation layer **400** by adherence of the protection film **700** or the polarizing film **600** during the manufacturing process is prevented, thereby reducing the production time and cost.

[0078] While this disclosure has been described in connection with what is presently considered to be practical 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. An organic light emitting diode display comprising:
- a substrate;
- an organic light emitting element provided over the substrate;
- a thin film encapsulation layer configured to seal the organic light emitting element together with the substrate;
- a phase delay layer provided over the thin film encapsulation layer and contacting the thin film encapsulation layer; and
- a polarizing film attached to the phase delay layer and having an area smaller than that of the phase delay layer.

2. The organic light emitting diode display of claim **1**, wherein each of the phase delay layer, the substrate, and the thin film encapsulation layer comprises a side, and
- wherein the sides of the phase delay layer, the substrate, and the thin film encapsulation are placed in the same plane.

3. The organic light emitting diode display of claim **1**, wherein each of the phase delay layer, the substrate, and the thin film encapsulation layer comprises a side having an angle with respect to a plane, and
- wherein the angle of the substrate, the angle of the thin film encapsulation layer, and the angle of the phase delay layer are the same.

4. The organic light emitting diode display of claim **1**, wherein the phase delay layer comprises:
- an adhesive layer contacting the thin film encapsulation layer; and
- a phase delay film provided over the thin film encapsulation layer with the adhesive layer therebetween.

5. A method for manufacturing an organic light emitting diode display, the method comprising:
- forming a plurality of organic light emitting elements distanced from each other over a mother substrate;
- forming a thin film encapsulation layer over the mother substrate so as to encapsulate the plurality of organic light emitting elements together with the mother substrate;
- forming, over the thin film encapsulation layer, a phase delay layer contacting the thin film encapsulation layer and a protection film attached to the phase delay layer;
- cutting the mother substrate, the thin film encapsulation layer, the phase delay layer, and the protection film at a region between two immediately neighboring organic light emitting elements among the plurality of organic light emitting elements into a plurality of unfinished organic light emitting diode displays;
- separating the protection film from the phase delay layer of a first one of the plurality of unfinished organic light emitting diode displays; and
- attaching a polarizing film to the phase delay layer of the first unfinished organic light emitting diode display wherein the polarizing film has an area smaller than that of the phase delay layer of the first unfinished organic light emitting diode display.

6. The method of claim **5**, wherein the mother substrate, the thin film encapsulation layer, the phase delay layer, and the protection film are cut by using a single cutting process.

7. The method of claim **5**, wherein the phase delay layer comprises an adhesive layer and a phase delay film attached to the adhesive layer, and

wherein the forming of a phase delay layer and a protection film is performed by adhering the phase delay layer using the adhesive layer to the thin film encapsulation layer while the protection film is attached to the phase delay film.

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专利名称(译)	有机发光二极管显示器及其制造方法		
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[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星移动显示器有限公司.		
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摘要(译)

有机发光二极管显示器包括基板;设置在基板上的有机发光元件;薄膜封装层，被配置为将有机发光元件与基板密封在一起;相位延迟层设置在薄膜封装层上并与薄膜封装层接触;偏振膜附着在相位延迟层上，其面积小于相位延迟层的面积。