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(54) **ORGANIC LIGHT-EMITTING DISPLAY DEVICE HAVING AN ADHESIVE LAYER BETWEEN A LOWER SUBSTRATE AND AN UPPER SUBSTRATE**

(71) Applicant: **LG Display Co., Ltd.**, Seoul (KR)

(72) Inventor: **Dong-Jin Kim**, Seoul (KR)

(73) Assignee: **LG Display Co., Ltd.**, Seoul (KR)

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(57) **ABSTRACT**

An organic light-emitting display device capable to improving the reliability is provided. The organic light-emitting display device may include an adhesive layer between a lower substrate and an upper substrate. Corner regions of the adhesive layer relatively disposed close to an edge of the lower substrate may include cutting portion, respectively. An align key may be disposed on the lower substrate exposed by the cutting portion of the corner region.

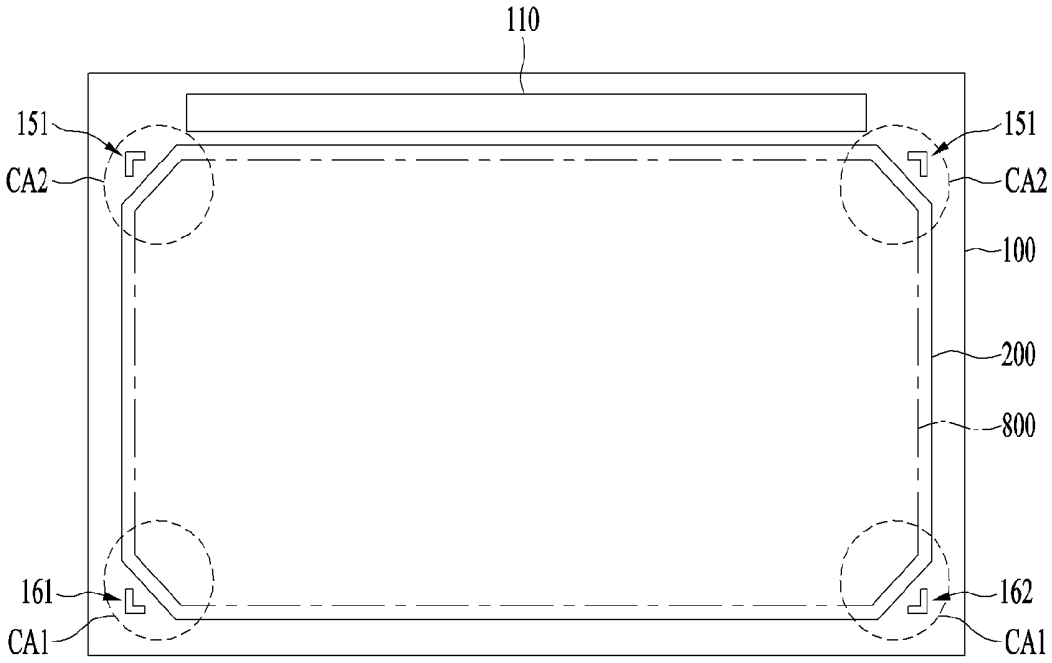


FIG. 1

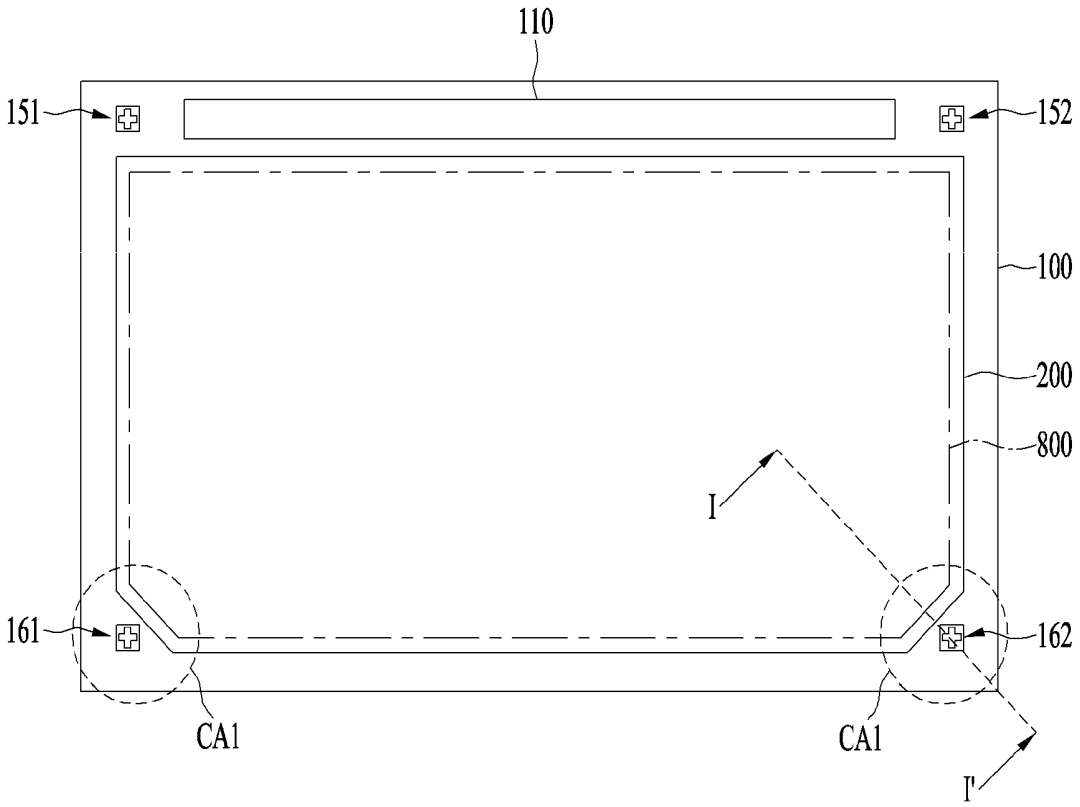

110
151
152
100
200
800
I
161
162
CA1
CA1
I'

FIG. 2

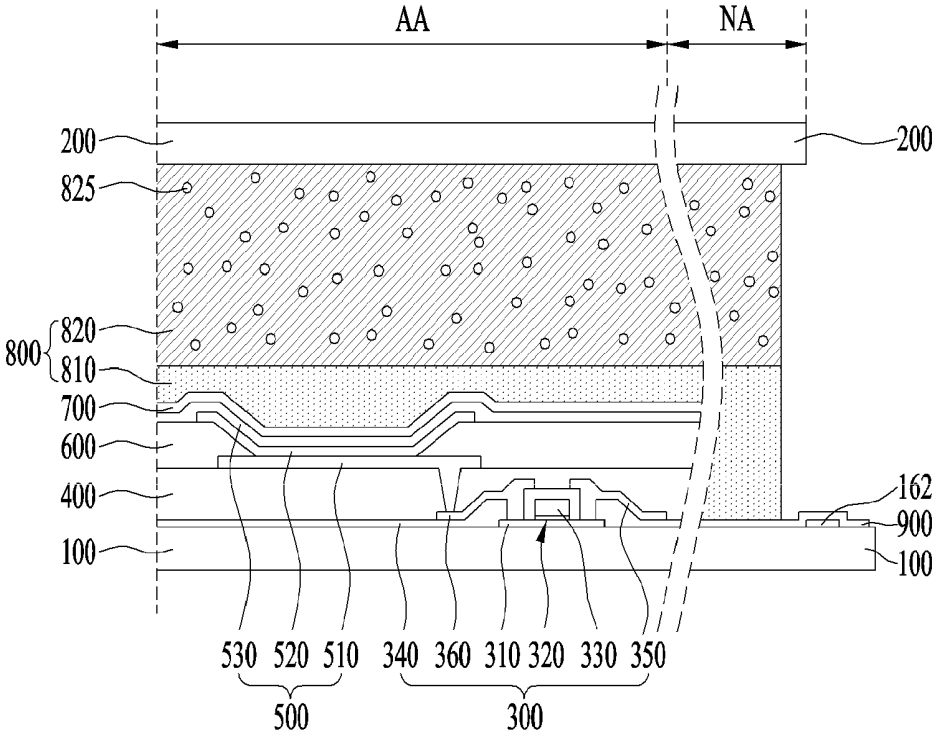

AA
NA
200
200
825
800
820
810
700
600
400
100
162
900
100
530 520 510 340 360 310 320 330 350
500
300

FIG. 3

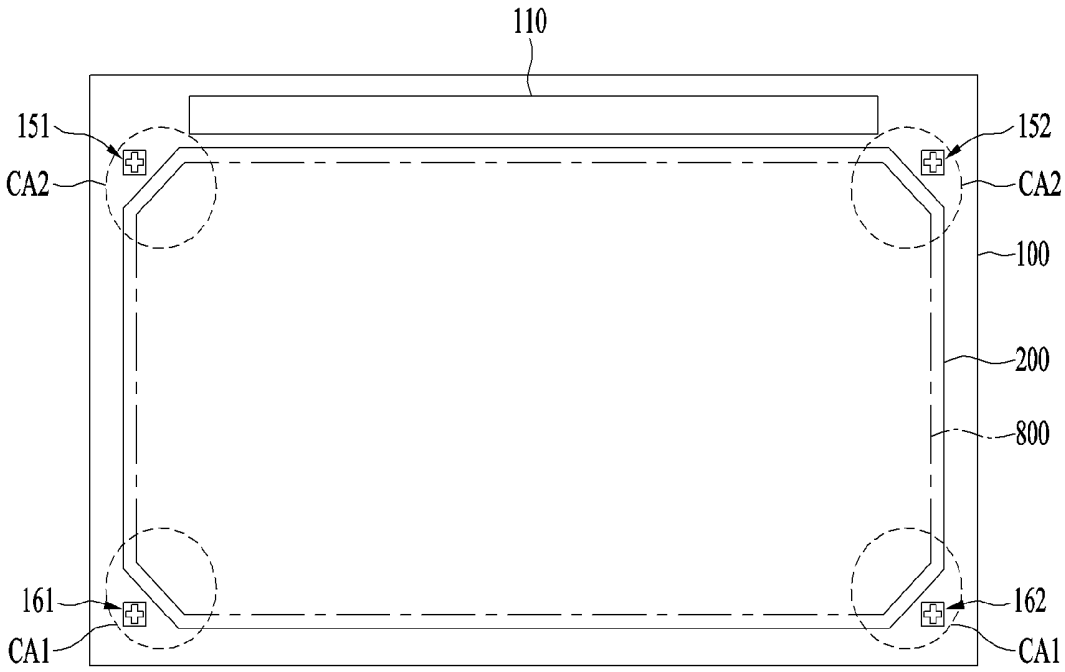

110
151
152
CA2
CA2
100
200
800
161
162
CA1
CA1

FIG. 4

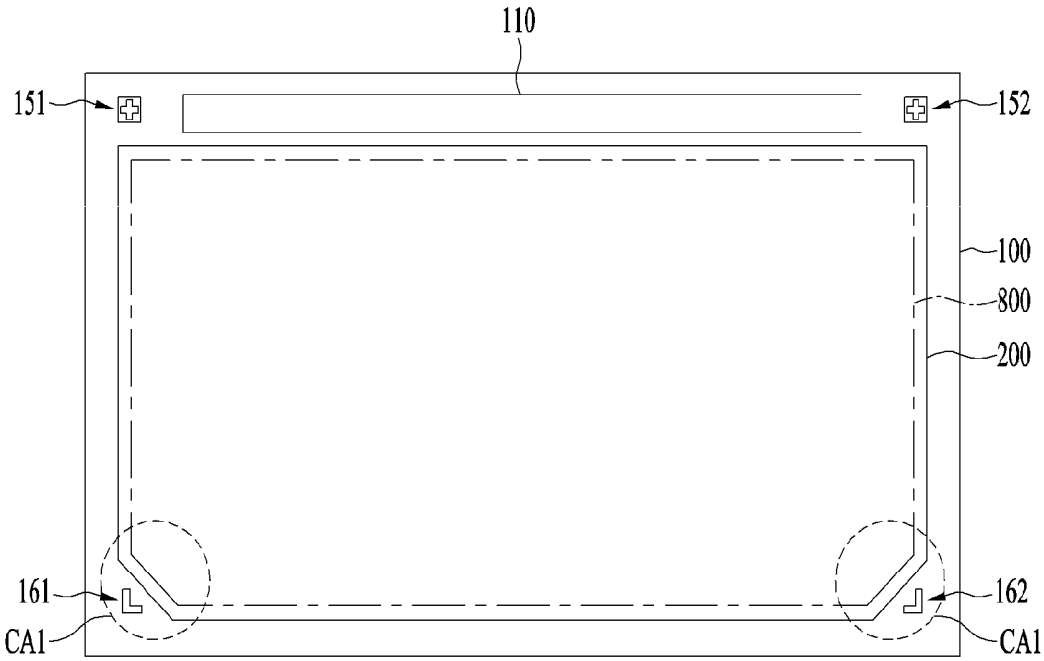

110
151
152
100
800
200
161
162
CA1
CA1

FIG. 5

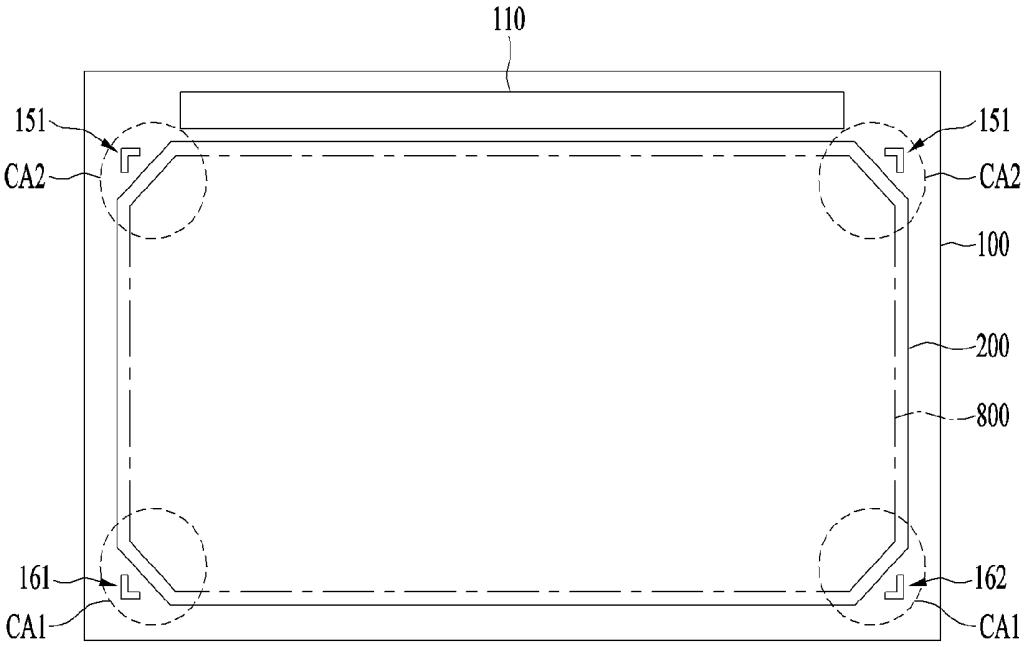
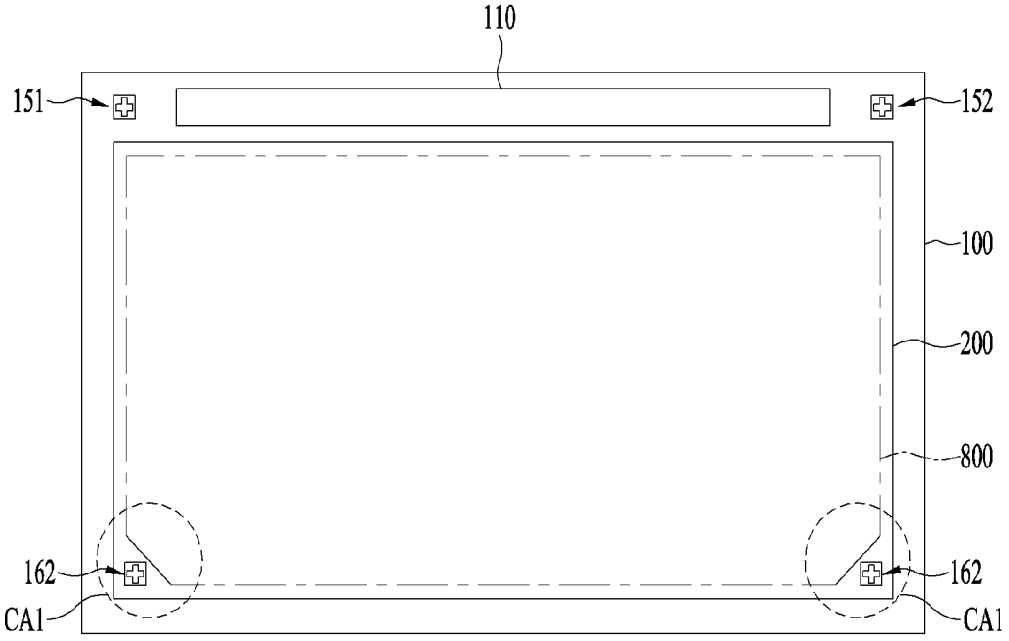

110
151
151
CA2
CA2
100
200
800
161
162
CA1
CA1

FIG. 6


110
151
152
100
200
800
162
162
CA1
CA1

ORGANIC LIGHT-EMITTING DISPLAY DEVICE HAVING AN ADHESIVE LAYER BETWEEN A LOWER SUBSTRATE AND AN UPPER SUBSTRATE

[0001] This application claims the priority benefit of Korean Patent Application No. 10-2016-0111718, filed on Aug. 31, 2016, which is hereby incorporated by reference as if fully set forth herein.

BACKGROUND

Technical Field

[0002] The present invention relates to an organic light-emitting display device in which an upper substrate is attached to a lower substrate by an adhesive layer.

Discussion of the Related Art

[0003] Generally, an electronic appliance, such as a monitor, a TV, a laptop computer, and a digital camera, include a display device to realize an image. For example, the display device may include a liquid crystal display device and an organic light-emitting display device.

[0004] The organic light-emitting display device may include a light-emitting structure on a display area. For example, the light-emitting structure may include a lower electrode, an organic light-emitting layer and an upper electrode, which are sequentially stacked.

[0005] The organic light-emitting layer may be very vulnerable to moisture. A method of forming the organic light-emitting display device may include an encapsulation process in order to prevent or delay the external moisture to permeating the organic light-emitting layer. For example, the method of forming the organic light-emitting display device may include a step of forming a device passivation layer on the light-emitting structure and a step of attaching an upper substrate to the device passivation layer using an adhesive layer having a moisture-absorbing material.

[0006] In the organic light-emitting display device including the adhesive layer, the external moisture may permeate through the adhesive layer. In Corner regions of the adhesive layer, an area contacting with the external moisture may be a relatively wide. That is, the corner regions of the adhesive layer may have a faster rate of the moisture permeation than other regions. Thereby, in the corner regions of the adhesive layer, the swell of the moisture-absorbing material by the absorbing of the moisture may proceed relatively quickly. Thus, in the organic light-emitting display device, the deformation or the damage of the lower substrate and/or the upper substrate may occur due to the stress difference by the swell of the moisture-absorbing material within the adhesive layer.

SUMMARY

[0007] Accordingly, the present invention is directed to an organic light-emitting display device having an adhesive layer between a lower substrate and an upper substrate that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0008] An object of the present invention is to provide an organic light-emitting display device capable of decreasing a rate of the moisture permeation in a corner region of an adhesive layer.

[0009] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0010] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, an organic light-emitting display device comprises a lower substrate, an upper substrate, and an adhesive layer. The lower substrate includes a pad portion. The upper substrate vertically overlaps the lower substrate. The lower substrate includes a non-display area exposed by the upper substrate. The pad portion is disposed at the non-display area of the lower substrate. The adhesive layer is disposed between the lower substrate and the upper substrate. Corner regions of the adhesive layer spaced far apart from the pad portion of the lower substrate include a first cutting portion, respectively.

[0011] The first cutting portions of the adhesive layer may have a chamfer shape, respectively.

[0012] First align keys may be disposed within the non-display area of the lower substrate exposed by the first cutting portions of the adhesive layer.

[0013] The first align keys may be symmetrical shapes.

[0014] Second align keys may be disposed within the non-display area of the lower substrate. The second align keys may be disposed close to the pad portion. The first align keys may be a shape different from the second align keys.

[0015] Each of the first align keys may be a concave shape with respect to the corresponding side surface of the adhesive layer.

[0016] Corner regions of the adhesive layer disposed close to the pad portion of the lower substrate may respectively include a second cutting portion. Each of the second align keys may be disposed within the corresponding second cutting portion.

[0017] A horizontal size of the adhesive layer may be smaller than a horizontal size of the upper substrate. A side surface of the upper substrate may be extended to parallel with a side surface of the adhesive layer.

[0018] The transmissivity of the upper substrate may be lower than the transmissivity of the lower substrate.

[0019] The upper substrate may include a metal.

[0020] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the inventive concepts as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention. In the drawings:

[0022] FIG. **1** is a top view schematically showing an organic light-emitting display device according to an embodiment of the present invention;

[0023] FIG. **2** is a cross-section view taken along I-I' of FIG. **1**.

[0024] FIGS. **3** to **6** are top views respectively showing various examples of an organic light-emitting display device according to another embodiment of the present invention.

DETAILED DESCRIPTION

[0025] Hereinafter, details related to the above objects, technical configurations, and operational effects of the embodiments of the present invention will be clearly understood by the following detailed description with reference to the drawings, which illustrate some embodiments of the present invention. Here, the embodiments of the present invention are provided in order to allow the technical sprit of the present invention to be satisfactorily transferred to those skilled in the art, and thus the present invention may be embodied in other forms and is not limited to the embodiments described below.

[0026] In addition, the same or extremely similar elements may be designated by the same reference numerals throughout the specification, and in the drawings, the lengths and thickness of layers and regions may be exaggerated for convenience. It will be understood that, when a first element is referred to as being "on" a second element, although the first element may be disposed on the second element so as to come into contact with the second element, a third element may be interposed between the first element and the second element.

[0027] Here, terms such as, for example, "first" and "second" may be used to distinguish any one element with another element. However, the first element and the second element may be arbitrary named according to the convenience of those skilled in the art without departing the technical sprit of the present invention.

[0028] The terms used in the specification of the present invention are merely used in order to describe particular embodiments, and are not intended to limit the scope of the present invention. For example, an element described in the singular form is intended to include a plurality of elements unless the context clearly indicates otherwise. In addition, in the specification of the present invention, it will be further understood that the terms "comprises" and "includes" specify the presence of stated features, integers, steps, operations, elements, components, and/or combinations thereof, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or combinations.

[0029] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which example embodiments belong. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and should not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

Embodiment

[0030] FIG. **1** is a top view schematically showing an organic light-emitting display device according to an embodiment of the present invention. FIG. **2** is a cross-section view taken along I-I' of FIG. **1**.

[0031] Referring to FIGS. **1** and **2**, the organic light-emitting display device according to the embodiment of the present invention may comprise a lower substrate **100**, an upper substrate **200**, a thin film transistor **300**, a light-emitting structure **500** and an adhesive layer **800**.

[0032] The lower substrate **100** may support the thin film transistor **300** and the light-emitting structure **500**. The lower substrate **100** may include an insulating material. The lower substrate **100** may include a transparent material. For example, the lower substrate **100** may include glass or plastic.

[0033] The lower substrate **100** may include a display area AA and a non-display area NA. The non-display area NA may be disposed at the outside of the display area AA. For example, the non-display area NA may surround the display area AA. A pad portion **110** for connecting to an external device may be disposed within the non-display area NA of the lower substrate **100**. For example, the pad portion **110** may be disposed outside a side surface of the display area AA.

[0034] The upper substrate **200** may be disposed on the lower substrate **100**. A horizontal size of the upper substrate **200** may be smaller than a horizontal size of the lower substrate **100**. For example, side surfaces of the upper substrate **200** may be disposed on an upper surface of the lower substrate **100**. The upper substrate **200** may vertically overlap the display area AA of the lower substrate **100**. The side surfaces of the upper substrate **200** may be disposed on the non-display area NA of the lower substrate **100**.

[0035] The non-display area NA of the lower substrate **100** may be exposed by the upper substrate **200**. The upper substrate **200** may expose the pad portion **110** of the lower substrate **100**. For example, corner regions of the upper substrate **200** spaced far apart from the pad portion **110** of the lower substrate **100** may be disposed close to an edge of the lower substrate **100** than corner regions of the upper substrate **200** located close to the pad portion **110** of the lower substrate **100**.

[0036] The upper substrate **200** may include a material having hardness more than a certain level. The upper substrate **200** may have a transmissivity lower than the lower substrate **100**. For example, the upper substrate **200** may include a metal, such as aluminum (Al) and copper (Cu).

[0037] The thin film transistor **300** may be disposed between the lower substrate **100** and the upper substrate **200**. For example, the thin film transistor **300** may be disposed on an upper surface of the display area AA of the lower substrate **100** facing the upper substrate **200**.

[0038] The thin film transistor **300** may include a semiconductor pattern **310** disposed close to the lower substrate **100**, a gate insulating layer **320** on the semiconductor pattern **310**, a gate electrode **330** on the gate insulating layer **320**, an interlayer insulating layer **340** covering the semiconductor pattern **310** and the gate electrode **330**, a source electrode **350** on the interlayer insulating layer **340** and a drain electrode **360** spaced apart from the source electrode **350** on the interlayer insulating layer **340**.

[0039] The semiconductor pattern **310** may include a semiconductor material. For example, the semiconductor pattern **310** may include amorphous silicon or polycrystalline silicon. For example, the semiconductor pattern **310** may include oxide semiconductor material, such as IGZO. The semiconductor pattern **310** may include a source region, a drain region and a channel region between the source region and the drain region.

[0040] The gate electrode **330** may overlap the channel region of the semiconductor pattern **310**. The source elec-

trode **350** may be electrically connected to the source region of the semiconductor pattern **310**. The drain electrode **360** may be electrically connected to the drain region of the semiconductor pattern **310**. For example, the interlayer insulating layer **340** may include a contact hole exposing the source region of the semiconductor pattern **310** and a contact hole exposing the drain region of the semiconductor pattern **310**.

[0041] The gate electrode **330**, the source electrode **350** and the drain electrode **360** may include a conductive material. For example, the gate electrode **330**, the source electrode **350** and the drain electrode **360** may include a metal. The drain electrode **360** may include the same material as the source electrode **350**. The gate electrode **330** may include a material different from the source electrode **350** and the drain electrode **360**.

[0042] The gate insulating layer **320** and the interlayer insulating layer **340** may include an insulating material. The gate insulating layer **320** may be disposed between the semiconductor pattern **310** and the gate electrode **330**. For example, the gate insulating layer **320** may include a side surface vertically aligned with a side surface of the gate electrode **330**. The side surface of the gate insulating layer **320** may be continuous with the side surface of the gate electrode **330**. The interlayer insulating layer **340** may extend beyond the semiconductor pattern **310**. For example, the interlayer insulating layer **340** may cover an upper surface of the lower substrate **100** disposed near the thin film transistor **300**.

[0043] The organic light-emitting display device according to the embodiment of the present invention is described that the thin film transistor **300** is in direct contact with the upper surface of the lower substrate **100**. However, the organic light-emitting display device according to another embodiment of the present invention may further comprise a buffer layer between the lower substrate **100** and the thin film transistor **300**. The buffer layer may include an insulating material.

[0044] The organic light-emitting display device according to the embodiment of the present invention is described that the semiconductor pattern **310** of the thin film transistor **300** is disposed close to the lower substrate **100**. However, in the organic light-emitting display device according to another embodiment of the present invention, the gate electrode **330** of the thin film transistor **300** may be disposed near the lower substrate **100**. For example, in the organic light-emitting display device according to another embodiment of the present invention, the semiconductor pattern **310** may be disposed between the gate electrode **330** and the source/drain electrodes **350** and **360**.

[0045] The organic light-emitting display device according to the embodiment of the present invention may further comprise a planarization layer **400** on the thin film transistor **300**. The planarization layer **400** may be disposed on the display area AA of the lower substrate **100**. The planarization layer **400** may remove a thickness difference due to the thin film transistor **300**. For example, an upper surface of the planarization layer **400** may be parallel with an upper surface of the lower substrate **100** on the display area AA of the lower substrate **100**.

[0046] The light-emitting structure **500** may realize a specific color. For example, the light-emitting structure **500** may include a lower electrode **510**, an organic light-emitting layer **520** and an upper electrode **530**, which are sequentially stacked.

[0047] The light-emitting structure **500** may be selectively driven by the thin film transistor **300**. For example, the lower electrode **510** of the light-emitting structure **500** may be electrically connected to the drain electrode **360** of the thin film transistor **300**. The light-emitting structure **500** may be disposed on the planarization layer **400**. The planarization layer **400** may include a contact hole exposing the drain electrode **360** of the thin film transistor **300**.

[0048] The lower electrode **510** and the upper electrode **530** may include a conductive material. The upper electrode **530** may include a material different from the lower electrode **510**. For example, the lower electrode **510** may include a transparent material, such as ITO and IZO, and the upper electrode **530** may include a metal having high-reflectance.

[0049] The organic light-emitting display device according to the embodiment of the present invention is described that the upper substrate **200** and the upper electrode **530** of the light-emitting structure **500** include a material having relatively lower transmissivity. However, in the organic light-emitting display device according to another embodiment of the present invention, the upper substrate **200** and the upper electrode **530** may include a transparent material. For example, the organic light-emitting display device according to another embodiment of the present invention may be top emission type in which the light is emitted toward the upper substrate **200**.

[0050] The organic light-emitting layer **520** may generate light having luminance corresponding to a voltage difference between the lower electrode **510** and the upper electrode **530**. The light generated by the organic light-emitting layer **520** may realize a specific color. For example, the light generated by the organic light-emitting layer **520** may realize blue color, green color, red color or white color.

[0051] The organic light-emitting layer **520** may include an emitting material layer (EML) having an organic emission material. The organic light-emitting layer **520** may have a multi-layer structure in order to increase luminous efficacy. For example, the organic light-emitting layer **520** may further include at least one of a hole injection layer (HIL), a hole transporting layer (HTL), an electron transporting layer (ETL), and an electron injection layer (EIL).

[0052] The organic light-emitting display device according to the embodiment of the present invention describes and shows only a pixel area realizing a single color. However, the organic light-emitting display device according to another embodiment of the present invention may include a plurality of the pixel area realizing different colors. For example, the organic light-emitting display device according to another embodiment of the present invention may include a red pixel area realizing red color, a blue pixel area realizing blue color, a green pixel area realizing green color and a white pixel area realizing white color.

[0053] The organic light-emitting display device according to the embodiment of the present invention may further comprise a bank insulating layer **600** covering an edge of the lower electrode **510**. The organic light-emitting layer **520** and the upper electrode **530** may be stacked on a surface of the lower electrode **510** exposed by the bank insulating layer **600**. The bank insulating layer **600** may include an insulating material. The lower electrodes **510** on the adjacent pixel areas may be insulated by the bank insulating layer **600**. For

example, the bank insulating layer **600** may include an organic insulating material, such as benzo cyclo-butene (BCB), poly-imide and photo-acryl.

[0054] The organic light-emitting display device according to the embodiment of the present invention may further comprise a device passivation layer **700** on the light-emitting structure **500**. The device passivation layer **700** may prevent and/or delay that the moisture permeating from the outside moves toward the organic light-emitting layer **520** of the light-emitting structure **500**. The device passivation layer **700** may include an insulating material. For example, the device passivation layer **700** may have a structure in which an organic layer having an organic material and an inorganic layer having an inorganic material are stacked alternately.

[0055] The adhesive layer **800** may be disposed between the device passivation layer **700** and the upper substrate **200**. The upper substrate **200** may be attached to the device passivation layer **700** by the adhesive layer **800**. The impact or the moisture permeation from the outside may be prevented and/or be mitigated by the adhesive layer **800**. The adhesive layer **800** may include a lower adhesive layer **810** and an upper adhesive layer **820**.

[0056] The lower adhesive layer **810** may be disposed close to the device passivation layer **700**. For example, the lower adhesive layer **810** may be in direct contact with the device passivation layer **700**. The lower adhesive layer **810** may be extended onto the non-display area NA of the lower substrate **100**. For example, the thin film transistor **300** and the light-emitting structure **500** may be completely covered by the adhesive layer **810**.

[0057] The lower adhesive layer **810** may include a curable material. For example, the lower adhesive layer **810** may include a resin, such as epoxy, phenol, unsaturated poly-ester, amino and olefin. The lower adhesive layer **810** may include a thermosetting resin.

[0058] The upper adhesive layer **820** may be disposed on the lower adhesive layer **810**. The upper adhesive layer **820** may be in direct contact with an upper surface of the lower adhesive layer **810** and a lower surface of the upper substrate **200**. The upper adhesive layer **820** may be extended onto the non-display area NA of the lower substrate **100**. For example, the upper adhesive layer **820** may have a side surface vertically aligned with a side surface of the lower adhesive layer **810**. The side surface of the upper adhesive layer **820** may be continuous with the side surface of the lower adhesive layer **810**.

[0059] The upper adhesive layer **820** may include a curable material. For example, the upper adhesive layer **820** may include a thermosetting resin. The upper adhesive layer **820** may include a material different from the lower adhesive layer **810**.

[0060] The upper adhesive layer **820** may further include the moisture-absorbing material. The stress due to the swell of the moisture-absorbing material within the upper adhesive layer **820** may be mitigated by the lower adhesive layer **810**.

[0061] A horizontal size of the adhesive layer **800** may be smaller than a horizontal size of the upper substrate **200**. For example, a lower surface of the extreme edge of the upper substrate **200** may be exposed by the adhesive layer **800**. The adhesive layer **800** may expose a pad portion **110** of the lower substrate **100**. Corner regions of the adhesive layer **800** spaced far away from the pad portion **110** of the lower substrate **100** may be disposed relatively close to an edge of the lower substrate **100** than corner regions of the adhesive layer **800** located near the pad portion **110** of the lower substrate **100**.

[0062] The corner regions of the adhesive layer **800** spaced far away from the pad portion **110** of the lower substrate **100** may include a first cutting portion CA**1**, respectively. Each of the first cutting portions CA**1** may indicate a portion where the corner region of the right angle shape is cut. For example, the first cutting portions CA**1** may respectively have a chamfer shape or a bevel shape.

[0063] The below table **1** shows the rate of the moisture permeation according to the shape of the corner region in the first adhesive layer and the second adhesive layer including different materials. Herein, the cutting portion is formed by cutting the corner region of the right angle shape along the straight line connecting the points shifted by the same distance in the first direction and the second direction perpendicular to the first direction (For example, a straight line connecting a point shifted by 1 mm in the horizontal direction and a point shifted by 1 mm in the vertical direction from the vertex of the corresponding corner region).

TABLE 1

	Corner region of right angle shape	Corner region having cutting portion
1^{st} adhesive layer	10.66 μm/hr	8.80 μm/hr
2^{nd} adhesive layer	8.53 μm/hr	5.86 μm/hr

[0064] Referring table **1**, regardless of the material of the adhesive layer **800**, it can be seen that the corner region having the cutting portion has a rate of the moisture permeation significantly lower than the corner region of the right angle shape.

[0065] Thereby, in the organic light-emitting display device according to the embodiment of the present invention, since each of the corner regions of the adhesive layer **800** disposed close to the edge of the lower substrate **100** and rapidly contacting with the external moisture includes a first cutting portion CA**1**, the rate of the moisture permeation may be decreased. Thus, in the organic light-emitting display device according to the embodiment of the present invention, the stress distribution due to the swell of the moisture-absorbing material within the adhesive layer **800** may be reduced.

[0066] The organic light-emitting display device according to the embodiment of the present invention may further comprise align keys **151**, **152**, **161** and **162** used in the alignment for etching process and/or separating process. The align keys **151**, **152**, **161** and **162** may include a material having high-reflectance, such as a metal. For example, the align keys **151**, **152**, **161** and **162** may include the same material as the gate electrode **330**, the source electrode **350**, the drain electrode **360** or the upper electrode **530**.

[0067] The align keys **151**, **152**, **161** and **162** may be disposed on the non-display area NA of the lower substrate **100**. The adhesive layer **800** may not cover the align keys **151**, **152**, **161** and **162**. The align keys **151**, **152**, **161** and **162** may be disposed outside the upper substrate **200**. For example, the align keys **151**, **152**, **161** and **162** may be disposed at the corner regions of the lower substrate **100**. The align keys **151**, **152**, **161** and **162** may include a first

align keys **161** and **162** which are disposed on the corner regions spaced far away from the pad portion **110** of the lower substrate **100**, and a second align keys **151** and **152** which are disposed on the corner regions located close to the pad portion **110** of the lower substrate **100**.

[0068] The first align keys **161** and **162** may be symmetrical shapes. The second align keys **151** and **152** may be symmetrical shapes. For example, all of the align keys **151**, **152**, **161** and **162** may be the same shape.

[0069] The first align keys **161** and **162** may be disposed on the first cutting portions CA**1** of the adhesive layer **800**. The side surface of the upper substrate **200** may be extended along the side surface of the adhesive layer **800**. That is, the organic light-emitting display device according to the embodiment of the present invention may include the first align keys **161** and **162** on the non-display area NA of the lower substrate **100** exposed by the first cutting portions CA**1** of the adhesive layer **800** and the upper substrate **200**. Thus, in the organic light-emitting display device according to the embodiment of the present invention, a horizontal width of the non-display area NA of the lower substrate **100** may be reduced. Therefore, in the organic light-emitting display device according to the embodiment of the present invention, the size of the display area AA of the lower substrate **100** may be increased.

[0070] Accordingly, in the organic light-emitting display device according to the embodiment of the present invention, the corner regions of the adhesive layer **800** disposed close to the edge of the lower substrate **100** may respectively include a first cutting portion CA**1** in order to improve the reliability, and the first align keys **161** and **162** may be disposed within the first cutting portion CA**1** in order to improve the luminous efficacy.

[0071] The organic light-emitting display device according to the embodiment of the present invention may further comprise a key passivation layer **900** on the align keys **151**, **152**, **161** and **162**. The key passivation layer **900** may completely cover the align keys **151**, **152**, **161** and **162**. The key passivation layer **900** may include an insulating material. For example, the key passivation layer **900** may include the same material as the gate insulating layer **320**, the interlayer insulating layer **340** or the device passivation layer **700**.

[0072] The organic light-emitting display device according to the embodiment of the present invention is described that only the corner regions of the adhesive layer **800** spaced far away from the pad portion **110** of the lower substrate **100** includes cutting portion CA**1**. However, in the organic light-emitting display device according to another embodiment of the present invention, all of the corner regions of the adhesive layer **800** may include a cutting portion CA**1** and CA**2**, as shown in FIG. **3**. For example, in the organic light-emitting display device according to another embodiment of the present invention, each of the corner regions of the adhesive layer **800** spaced far away from the pad portion **110** of the lower substrate **100** may include a first cutting portion CA**1**, and each of the corner regions of the adhesive layer **800** disposed close to the pad portion **110** of the lower substrate **100** may include a second cutting portion CA**2**. In the organic light-emitting display device according to another embodiment of the present invention, the second align keys **151** and **152** may be disposed within the second cutting portions CA**2** of the adhesive layer **800**, respectively. Thus, in the organic light-emitting display device according to another embodiment of the present invention, the pad portion **110** of the lower substrate **100** may be extended to the non-display area NA close to the corner regions of the lower substrate **100**. That is, in the organic light-emitting display device according to another embodiment of the present invention, the display area AA of the lower substrate **100** may be largely increased. Therefore, in the organic light-emitting display device according to another embodiment of the present invention, the reliability and the luminous efficacy may be greatly improved.

[0073] The organic light-emitting display device according to the embodiment of the present invention is described that the first align keys **161** and **162** may be the same shape as the second align keys **151** and **152**. However, in the organic light-emitting display device according to another embodiment of the present invention, the first align keys **161** and **162** may be a shape different from the second align keys **151** and **152**, as shown in FIG. **4**. For example, in the organic light-emitting display device according to another embodiment of the present invention, each of the first align keys **161** and **162** may be a concave shape with respect to an adjacent side surface of the adhesive layer **800**. For example, in the organic light-emitting display device according to another embodiment of the present invention, each of the first align keys **161** and **162** may be a '└', shape or '┘' shape. Thus, in the organic light-emitting display device according to another embodiment of the present invention, the first align keys **161** and **162** may be sufficiently disposed within the corresponding first cutting portion CA**1** of the adhesive layer **800**, respectively. Therefore, in the organic light-emitting display device according to another embodiment of the present invention, the luminous efficacy may be improved by the location of the first align keys **161** and **162**.

[0074] Also, in the organic light-emitting display device according to further another embodiment of the present invention, the adhesive layer **800** may include the first cutting portions CA**1** and the second cutting portions CA**2**, the first align keys **161** and **162** may be disposed on the lower substrate **100** exposed by the first cutting portions CA**1**, the second align keys **151** and **152** may be disposed on the lower substrate **100** exposed by the second cutting portions CA**2**, and each of the align keys **151**, **152**, **161** and **162** may be a concave shape toward an corresponding adjacent side surface of the adhesive layer **800**, as shown in FIG. **5**. Thus, in the organic light-emitting display device according to further another embodiment of the present invention, each of the align keys **151**, **152**, **161** and **162** may be sufficiently disposed within the corresponding cutting portion CA**1** and CA**2** of the adhesive layer **800**. Therefore, in the organic light-emitting display device according to further another embodiment of the present invention, the size of the non-display area NA of the lower substrate **100** may be minimized.

[0075] The organic light-emitting display device according to the embodiment of the present invention is described that the side surface of the upper substrate **200** extends along the side surface of the adhesive layer **800**. However, in the organic light-emitting display device according to another embodiment of the present invention, the upper substrate **200** having a transparent material may be extended onto the first align keys **161** and **162** within the first cutting portions CA**1** of the adhesive layer **800**. Thus, in the organic light-emitting display device according to another embodiment of the present invention, overflowing the adhesive layer **800** to

the side surface of the upper substrate **200** due to the miss-alignment between the upper substrate **200** and the adhesive layer **800** may be prevented, so that the reliability and the luminous efficacy may be improved.

[0076] In the result, the organic light-emitting display device according to the embodiments of the present invention may decrease the rate of the moisture permeation by changing the shape of the corner regions of the adhesive layer. Thus, in the organic light-emitting display device according to the embodiments of the present invention, the deformation and the damage of the lower substrate and/or the upper substrate due to the stress variation of the moisture-absorbing material within the adhesive layer may be prevented. Thereby, in the organic light-emitting display device according to the embodiments of the present invention, the reliability may be improved.

[0077] It will be apparent to those skilled in the art that various modifications and variations can be made in the organic light-emitting display device having an adhesive layer between a lower substrate and an upper substrate of the present disclosure without departing from the technical idea or scope of the disclosure. Thus, it is intended that the present disclosure cover the modifications and variations of this disclosure provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. An organic light-emitting display device, comprising:

a lower substrate including a pad portion;

an upper substrate vertically overlapping with the lower substrate, the lower substrate including a non-display area exposed by the upper substrate, the pad portion disposed within the non-display area of the lower substrate; and

an adhesive layer between the lower substrate and the upper substrate,

wherein the corner regions of the adhesive layer spaced far apart from the pad portion of the lower substrate include a first cutting portion, respectively.

2. The organic light-emitting display device according to claim **1**, wherein the first cutting portions of the adhesive layer have a chamfer shape, respectively.

3. The organic light-emitting display device according to claim **1**, further comprising first align keys within the non-display area of the lower substrate exposed by the first cutting portions of the adhesive layer.

4. The organic light-emitting display device according to claim **3**, wherein the first align keys are symmetrical shapes.

5. The organic light-emitting display device according to claim **3**, further comprising second align keys within the non-display area of the lower substrate, the second align keys disposed close to the pad portion,

wherein the first align keys are a shape different from the second align keys.

6. The organic light-emitting display device according to claim **5**, wherein each of the first align keys is a concave shape with respect to the corresponding side surface of the adhesive layer.

7. The organic light-emitting display device according to claim **5**, wherein corner regions of the adhesive layer disposed close to the pad portion of the lower substrate respectively include a second cutting portion, and

wherein each of the second align keys is disposed within the corresponding second cutting portion.

8. The organic light-emitting display device according to claim **1**, wherein a horizontal size of the adhesive layer is smaller than a horizontal size of the upper substrate, and

wherein a side surface of the upper substrate is extended to parallel with a side surface of the adhesive layer.

9. The organic light-emitting display device according to claim **1**, wherein the transmissivity of the upper substrate is lower than the transmissivity of the lower substrate.

10. The organic light-emitting display device according to claim **9**, wherein the upper substrate includes a metal.

* * * * *

专利名称(译)	有机发光显示装置，其在下基板和上基板之间具有粘合层		
公开(公告)号	US20180062111A1	公开(公告)日	2018-03-01
申请号	US15/690483	申请日	2017-08-30
[标]申请(专利权)人(译)	乐金显示有限公司		
申请(专利权)人(译)	LG DISPLAY CO. , LTD.		
当前申请(专利权)人(译)	LG DISPLAY CO. , LTD.		
[标]发明人	KIM DONG JIN		
发明人	KIM, DONG-JIN		
IPC分类号	H01L51/52 H01L23/544 H01L51/00		
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摘要(译)

提供了一种能够提高可靠性的有机发光显示装置。有机发光显示装置可以包括在下基板和上基板之间的粘合层。靠近下基板的边缘相对设置的粘合剂层的拐角区域可以分别包括切割部分。对准键可以设置在由拐角区域的切割部分暴露的下基板上。