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(54) **Dual-type organic electroluminescent display device and method for manufacturing the same**

Duale organische elektrolumineszente Anzeigevorrichtung und Herstellungsverfahren

Dispositif d'affichage électroluminescent organique double et méthode de fabrication

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EP 1 391 945 B1

Description

[0001] The present invention relates to an organic electroluminescent (EL) display device, and, more particularly, to a dual-type organic electroluminescent display device having two organic EL display panels.

[0002] In general, electroluminescent display devices, which are spontaneous emission display devices for emitting light by exciting fluorescent organic compounds, have advantageous features such as a low driving voltage, and being thin and light. Also, much attention has been paid to electroluminescent display devices because they have advantageous features suitable for the next generation of display devices that can overcome several problems with LCDs, such as a wide viewing angle and a high response speed.

[0003] An organic electroluminescent display device (to be abbreviated as an organic EL device, hereinafter) basically operates as follows. When power is supplied, current flows while electrons migrate. At a negative electrode, the electrons move to an emitting layer through an electron transport layer. At a positive electrode, holes move to the emitting layer through a hole transport layer. The electrons and holes combine at the emitting layer, made of an organic material, to generate excitons having a high energy. The organic material constituting the emitting layer is capable of achieving a display of various colors, according to the organic electroluminescent material used.

[0004] In recent years, dual-type display devices have been increasingly demanded by users because they are capable of simultaneously displaying two picture screens in a folder-type electronic device such as a cellular phone.

[0005] For instance, referring to FIG. 1, a dual-type organic EL device includes a main organic EL display panel 10 and a sub organic EL display panel 20 coupled to each other so as to be viewed through the front and rear surfaces of the device.

[0006] In the dual-type organic EL device, the main organic EL display panel 10 includes a substrate 11, an organic EL portion 12 formed on the substrate 11, a cap 14 for protectively surrounding the organic EL portion 12, an absorbent 15 arranged in the cap 14, and a polarization plate 16 installed on one plane of the substrate 11. The sub organic EL display panel 20 coupled to the main organic EL display panel 10 has substantially the same configuration as that of the main organic EL display panel 10, and includes a substrate 21, an organic EL portion 22, a cap 23, an absorbent 24 and a polarization plate 25.

[0007] In the dual-type organic EL device, a user can selectively use information displayed on either the front panel or the rear panel, that is, either the main organic EL display panel 10 or the sub organic EL display panel 20. The dual-type organic EL device can be applied to, for example, a folder-type electronic device.

[0008] Another example of the dual-type organic EL device is shown in FIG. 2. Referring thereto, the dual-type organic EL device includes projections 32 and 42,

of caps 31 and 41 of a main organic EL display panel 30 and a relatively smaller sub organic EL display panel 40, that are alternately disposed so that the overall thickness of the dual-type organic EL device is reduced.

[0009] In the dual-type organic EL device, when the cap 31 of the main organic EL display panel 30 contacts the cap 41 of the sub organic EL display panel 40, the organic EL device becomes bulky due to the heights of the cap 31 and 41 of the respective panels 30 and 40. Thus, there is still a limitation in thinning the dual-type organic EL device.

[0010] FIG. 3 shows still another example of a dual-type organic EL device, in which an organic EL display panel 50 and a liquid crystal display (LCD) panel 60 are coupled to each other.

[0011] Japanese Patent Publication No. 2000-58260 discloses a bilateral emission type EL device, which is configured such that a cathode electrode, made of a metal having a low work function, is interposed between two EL material layers, and respective transparent electrodes are installed on each of the upper and lower surfaces of the EL material layers. The disclosed device, however, has a problem in that arrangement of an absorbent for protecting the EL material layers against moisture is very difficult work.

[0012] Japanese Patent Publication No. Hei 10-255974 discloses a bi-directionally driven organic EL device. The disclosed organic EL device includes a pair of electrodes, at least one of which is transparent or semi-transparent, a host emission layer, which emits light by recombination of holes and electrons injected from both electrodes and made of an organic fluorescent material, and a pair of carrier transport layers disposed between the host emission layer and each of the electrodes, capable of transporting the holes and electrons injected from the respective electrodes and effectively confining the holes and electrons in the host emission layer, and which transmits light at the maximum area of the emitted light.

[0013] Also, Japanese Patent Publication No. 2001-332392 discloses a bilateral emission type EL device. The disclosed device includes organic layers having an electron transport layer, an organic emitting layer and a hole transport layer stacked between an opaque cathode and a transparent anode, and a transparent member provided at least at one portion of the opaque cathode as a light guide portion.

[0014] Japanese patent publication No. 2000-100558 describes a display element with organic layers. Embodiments have a pair of organic layers on respective substrates.

[0015] WO 01/44866 describes the use of spacers to space a cap from an organic LED layer.

[0016] JP 63-64082 describes an electroluminescent display with a pair of spaced apart transparent substrates facing each other and display materials such as ZnS: TbF₃ CaS:Ce, ZnS:SmF₃, CaS:Eu.

[0017] As described above, in the bilateral emission

type organic EL device having the above-described configuration, an image is formed by a cathode and anode with organic layers interposed therebetween. Thus, a dual image display cannot be achieved.

[0018] In an aspect the present invention provides a dual-type organic electroluminescent display (EL) device according to claim 1.

[0019] The aspect of the invention may provide a dual-type organic EL device which can independently display an image on each of both surfaces thereof, and can reduce the thickness thereof.

[0020] The dual-type organic EL device may have an extended lifetime thereof by preventing moisture from infiltrating into organic layers thereof.

[0021] The dual-type organic EL device may have enhanced structural strength by increasing a supporting force in a gap between front and rear substrates when adhered to each other.

[0022] Additional aspects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0023] The dual-type organic EL device comprises a spacer member provided on at least one of facing surfaces of the main and sub organic EL panels, maintaining a gap between the main and sub organic EL display panels and increasing the structural strength thereof.

[0024] The area of the main organic EL portion may be greater than that of the sub organic EL portion.

[0025] In an example not forming part of the invention, the spacer member may be provided on the sub substrate other than the sub organic EL portion.

[0026] The dual-type organic EL device may further comprise an absorbing unit preventing moisture from infiltrating into the main and sub organic EL portions, the absorbing unit provided in a sealed area defined by the sealing member.

[0027] The absorbing unit may include an absorbent in a recess formed in at least one portion of either the main substrate or the sub substrate in the sealed area defined by the sealing member, and a porous tape adhered to the substrate having the recess, for preventing outflow of the absorbent.

[0028] The absorbing unit may be in the shape of a sheet.

[0029] Also, passivation layers covering the main organic EL portion and the sub organic EL portion may be provided on the main substrate and the sub substrate, respectively.

[0030] The main organic EL display panel may comprise a transparent main substrate, a first electrode formed on the transparent main substrate in a predetermined pattern, a first insulation layer pattern defining a predetermined light emitting area, organic layers formed over the first electrode and the first insulation layer in a predetermined pattern, and a second electrode having a predetermined pattern in a direction orthogonal to the first electrode; in this case, the sub organic EL display

panel comprises a transparent sub substrate, a third electrode formed on the transparent sub substrate in a predetermined pattern, a second insulation layer pattern defining a predetermined light emitting area, organic layers formed over the third electrode and the second insulation layer in a predetermined pattern, and a fourth electrode having a predetermined pattern in a direction orthogonal to the third electrode.

[0031] In accordance with another aspect of the present invention, there is provided a method of manufacturing a dual-type organic EL device according to claim 15.

[0032] The method may further comprise aging the main organic EL display panel and the sub organic EL display panel.

[0033] The method also may further comprise providing an absorbing unit, the absorbing unit preventing moisture from infiltrating into the main and sub organic EL portions. The absorbing unit may be in the shape of a sheet.

[0034] The method may further comprise providing passivation layers covering the main organic EL portion and the sub organic EL portion on the main substrate and the sub substrate, respectively.

[0035] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a cross-sectional view of a conventional dual-type organic EL device;

FIGS. 2 and 3 are cross-sectional views showing other examples of conventional dual-type organic EL device;

FIG. 4 is a cross-sectional view of a dual-type organic EL device according to a comparative example;

FIG 5 is a partially perspective view of the organic EL device shown in FIG. 4;

FIGS. 6 through 10 are cross-sectional views illustrating examples of dual-type organic EL devices, Figure 9 being an embodiment of the present invention; and

FIG. 11 is a block diagram illustrating sequential operations of a method of manufacturing a dual-type organic EL device according to an embodiment of the present invention.

[0036] Reference will now be made in detail to the present preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

[0037] FIGS. 4 and 5 show examples of an organic EL device according to a comparative example. Referring to FIG. 4, a dual-type organic EL device 100 includes a

main organic EL display panel 110 and a sub organic EL display panel 120. A sealing member 130 hermetically seals the sub organic EL display panel 120 and the main organic EL display panel 110 to each other at both edges, thereby allowing the operation of simultaneously displaying independent images on the two panels.

[0038] The main organic EL display panel 110 includes a main substrate 111 and a main organic EL portion 112 formed on the main substrate 111. The main substrate 111 is made of a transparent material for transmitting light formed by the main organic EL portion 112, or dark tint glass for increasing contrast. The main organic EL portion 112 includes a first electrode 113 formed on the main substrate 111, a first insulation layer 114 formed to expose the first electrode 113 in a predetermined pattern so as to form a pixel on the main substrate 111 having the first electrode 113, a first organic layer (not shown) formed over the first insulation layer 114 and the first electrode 113, and a second electrode 118 formed on the first organic layer in a predetermined pattern.

[0039] The sub organic EL display panel 120 includes a sub substrate 121, and a sub organic EL portion 122 formed on the sub substrate 121. The sub organic EL display panel 120 has substantially the same configuration as that of the main organic EL portion 112. In other words, the sub organic EL portion 122 includes a third electrode 123 formed on the sub substrate 121, a second insulation layer 124 formed to expose the third electrode 123 in a predetermined pattern so as to form a pixel on the sub substrate 121, a second organic layer (not shown) formed over the second insulation layer 124 and the third electrode 123, and a fourth electrode 126 formed on the second organic layer in a predetermined pattern.

[0040] The sealing member 130, for sealing the sub organic EL display panel 120 and the main organic EL display panel 110 that are to be adhered to each other, is applied to edges of the main and sub organic EL display panels 110 and 120 so that the main and sub organic EL portions 112 and 122 may not be exposed to outside elements, thereby preventing infiltration of moisture. The height (or thickness) of the sealing member 130, applied for sealing the main and sub organic EL portions 112 and 122, is preferably as small as possible for effectively suppressing infiltration of moisture.

[0041] As shown in FIGS. 5 and 6, an absorbing unit 140, for preventing damage of the first and second organic layers 115 and 125 of the main and sub organic EL portions 112 and 122 due to moisture infiltrated through the sealing member 130, is installed inside a sealed area defined by the sealing member 130.

[0042] The absorbing unit 140 may be installed in the main substrate 111 or the sub substrate 121. As shown in FIG. 6, a recess 141 is formed at the peripheral portion of the sub substrate 121 having the sub organic EL portion 122 that is relatively smaller than the main organic EL portion 122, and the recess 141 is filled with an absorbent 142, e.g., glyceryl dioleate (GDO). A porous tape is adhered to the recess 141 for preventing outflow of the

absorbent 142. The absorbing unit 140 is not limited to that illustrated in the above-described comparative example, that is, any structure capable of absorbing moisture, while not causing damage to organic EL portions, can be adopted. For example, the absorbing unit 140 may be in the shape of a sheet adhered to the recess 141.

[0043] In order to protect the main and sub organic EL portions 112 and 122, as shown in FIG. 7, passivation layers 118 and 128 can be provided. In this case, an absorbent sheet (not shown) is preferably installed between the passivation layers 118 and 128. As shown in FIG. 8, preferably, the passivation layers 118 and 128, covering the main and sub organic EL portions 112 and 122, are closely adhered to each other or integrally formed to remove a space therebetween and then are sealed by the sealing member 130 at edges thereof.

[0044] According to the present invention in order to increase the structural strength of the main and sub organic EL display panels 110 and 120, sealed to each other by the sealing member 130, against external force, as shown in FIG. 9, a spacer member 150 is formed on at least one of facing surfaces of the main and sub organic EL panels 110 and 120. More specifically, the spacer member 150 is formed on the first or second insulation layer (not shown) of the main or sub organic EL panel 110, 120, that is, on an area of the organic EL portion 112, 122. The spacer member 150 is incorporated into the first or second insulation layer.

[0045] FIG. 10 shows a comparative example of a spacer member. Referring thereto, the spacer 160 is formed on an area of the substrate 121 other than the sub organic EL portion 122. In this case, the spacer 160 is preferably formed when forming the insulation layer of the sub organic EL display panel.

[0046] A polarization plate (not shown) may be adhered to the outer surfaces of the main substrate 111 and the sub substrate 121.

[0047] Unlike the conventional dual-type organic EL device, the dual-type organic EL device having the above-described configuration is configured such that main and sub organic EL display panels are sealed to each other without a cap, thereby greatly reducing the overall thickness of the device. In particular, since the absorbing unit 140 is installed inside a sealed area defined by the sealing member 130, it is possible to prevent the organic layers 115 and 125 of the main and sub organic EL portions 112 and 122 from being damaged due to infiltration of external moisture. Also, since the spacer member 150, 160 is installed between the main and sub organic EL display panels 110 and 120, the structural strength against external force can be increased.

[0048] A method of manufacturing the dual-type organic EL device having the above-described configuration will now be described with reference to FIG. 11.

[0049] First, a main substrate of a main organic EL display panel is prepared. The main substrate is preferably made of a transparent material, e.g., glass. A first electrode, in the shape of a strip, is formed on the top

surface of the main substrate in a predetermined pattern. In this operation, the first electrode is formed by coating a transparent conductive layer, e.g., an indium tin oxide layer (ITO), onto the transparent substrate, and then performing a photolithography process using a photomask having a pattern corresponding to the first electrode for exposure, development, and etching.

[0050] Then, a first insulation layer is formed on the main substrate having the first electrode. The first insulation layer may be formed of a plurality of strips in a direction orthogonal to the first electrode by photolithography, or may be formed on the entire surface of the main substrate, exclusive of a pixel area, in a matrix type.

[0051] After forming the first insulation layer, the first organic layer is formed over the first electrode and the first insulation layer. The first organic layer forming operation includes forming a hole transport layer, forming an emitting layer, and forming an electron transport layer, the respective sub-operations being sequentially performed.

[0052] After forming the first organic layer, a second electrode shaped of a strip is formed on the top surface of the first organic layer. The second electrode may be formed by deposition of a highly conductive metal, e.g., aluminum, silver, or silver alloy.

[0053] While the main organic EL display panel is manufactured, the sub organic EL display panel is manufactured in the same manner.

[0054] After completing the manufacture of the main organic EL display panel and the sub organic EL display panel, the main organic EL display panel and the sub organic EL display panel are subjected to aging.

[0055] Thereafter, a main substrate of the main organic EL display panel and a sub substrate of the sub organic EL display panel are sealed to each other at their edges by a sealing member, thereby preventing organic EL portions of the main and sub organic EL display panels from being exposed to outside moisture.

[0056] As described above, in the manufacture of the dual-type organic EL device, the operation of forming the first or second insulation layer further includes forming a spacer member for maintaining a gap between the main substrate and the sub substrate. Also, an operation of forming passivation layers, for protecting the organic EL portions of the main and sub organic EL display panels, may be further provided.

[0057] In the operation of forming a spacer member, the spacer member projecting from the first insulation layer is integrally formed in a non-pixel area when forming the first insulation layer of the main organic EL display panel. Likewise, the spacer member projecting from the second insulation layer is integrally formed in a non-pixel area when forming the second insulation layer of the sub organic EL display panel.

[0058] Alternatively, in manufacturing the main and sub organic EL display panels, an absorbing unit capable of absorbing moisture may be further installed on at least one of facing surfaces thereof. The operation of installing

the absorbing unit may further include forming a recess at one side of the sub substrate in the operation of preparing the sub substrate, filling the recess with an absorbent in the operation of sealing the main substrate and the sub substrate to each other, and adhering a porous tape to the sub substrate.

[0059] As described above, according to the dual-type organic EL device of these embodiments of the present invention, the first and second organic layers are protected from external moisture by sealing main and sub organic EL display panels to each other. Also, the overall thickness of the device can be reduced by making the height of a sealing member for sealing the main and sub organic EL display panels to each other as small as possible. Further, since an absorbing unit for removing moisture is installed inside a sealed area defined by the sealing member, it is possible to protect the first and second organic layers from being damaged by moisture. Since a spacer member is installed on the main substrate or the sub substrate, the structural strength of the main and sub organic EL display panels can be enhanced.

[0060] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles of the invention, the scope of which is defined in the claims.

Claims

1. A dual-type organic electroluminescent display, EL, device comprising:

a main organic EL display panel (110) having a main substrate (111) and a main organic EL portion (112) formed on the main substrate;
a sub organic EL display panel (120) having a sub substrate (121) and a sub organic EL portion (122) formed on the sub substrate;
a sealing member (130) sealing the main substrate and the sub substrate to each other, wherein the main organic EL portion and the sub organic EL portion are hermetically sealed facing each other; and
a spacer member (150), provided on at least one of the facing surfaces of the main and sub organic EL panels, maintaining a gap between the main and sub organic EL display panels and increasing the structural strength thereof;

characterised in that the main organic EL portion (112) and the sub organic EL portion (122) each comprises an insulation layer (114, 124) formed to expose an electrode (113, 123) of the respective main or sub organic EL display panel in a predetermined pattern forming a pixel on the respective main or sub substrate, and the spacer member (150) is formed

on and integrally with the insulation layer of the main or sub organic EL display panel (110,120).

2. The dual-type organic EL device according to claim 1, wherein the area of the main organic EL portion (112) is greater than that of the sub organic EL portion (122).
3. The dual-type organic EL device according to any preceding claim further comprising an absorbing unit (140) preventing moisture from infiltrating into the main and sub organic EL portions, the absorbing unit provided in a sealed area defined by the sealing member.
4. The dual-type organic EL device according to claim 3, wherein the absorbing unit (140) comprises an absorbent (142) in a recess (141) formed in at least one portion of either the main substrate or the sub substrate in the sealed area defined by the sealing member.
5. The dual-type organic EL device according to claim 4, further comprising a porous tape preventing outflow of the absorbent, wherein the porous tape is adhered to the substrate having the recess.
6. The dual-type organic EL device according to claim 3, 4, or 5, wherein the absorbing unit (140) is in the shape of a sheet.
7. The dual-type organic EL device according to any preceding claim, further comprising passivation layers (118,128) covering the main organic EL portion and the sub organic EL portion, wherein the passivation layers are provided on the main substrate and the sub substrate, respectively.
8. The dual-type organic EL device according to claim 7, further comprising an absorbent sheet provided between the passivation layers.
9. The dual-type organic EL device according to claim 7 or 8, wherein the passivation layers (118,128) are closely adhered to each other, and sealed by the sealing member at edges of the passivation layers.
10. The dual-type organic EL device according to claim 7, 8, or 9, wherein the passivation layers (118,128) are integrally formed, and sealed by the sealing member at edges of the passivation layers.
11. The dual-type organic EL device according to any preceding claim wherein at least one of the main substrate (111) and the sub substrate (121) is made of a transparent material for transmitting light formed by the main organic EL portion.

12. The dual-type organic EL device according to claim 11, wherein the transparent material is contrast increasing dark tint glass.

13. The dual-type organic EL device according to any preceding claim, further comprising a polarization plate adhered to an outer surface of at least one of the main substrate and the sub substrate.

14. The dual-type organic electroluminescent display (EL) device according to any preceding claim:

wherein the main organic EL display panel comprises:

a transparent main substrate (111),
a first electrode formed on the transparent main substrate in a first predetermined pattern,
a first insulation layer pattern defining a predetermined light emitting area,
organic layers (112) formed over the first electrode and the first insulation layer in a predetermined pattern forming the main organic EL portion,
a second electrode having a second predetermined pattern in a direction orthogonal to the first electrode; and

the sub organic EL display panel comprises:

a transparent sub substrate (121),
a third electrode formed on the transparent sub substrate in a third predetermined pattern,
a second insulation layer pattern defining a predetermined light emitting area,
organic layers (122) formed over the third electrode and the second insulation layer in a predetermined pattern forming the sub organic EL portion, and
a fourth electrode having a fourth predetermined pattern in a direction orthogonal to the third electrode.

15. A method of manufacturing a dual-type organic EL device, the method comprising:

preparing a main organic EL display panel, comprising:

forming a first electrode on a transparent main substrate (111) in a first predetermined pattern,
forming a first insulation layer formed to expose the first electrode in a predetermined pattern so as to form a pixel on the main substrate,

forming organic layers (121) over the first electrode and the first insulation layer in a predetermined pattern forming the main organic EL portion, and
forming a second electrode having a second predetermined pattern in a direction orthogonal to the first electrode;

preparing a sub organic EL display panel; comprising:

forming a third electrode on a transparent sub substrate (121) in a third predetermined pattern,
forming a second insulation layer formed to expose the third electrode in a predetermined pattern so as to form a pixel on the sub substrate,
forming organic layers (122) over the third electrode and the second insulation layer in a predetermined pattern forming the sub organic EL portion,
forming a fourth electrode having a fourth predetermined pattern in a direction orthogonal to the third electrode;

sealing the main substrate and the sub substrate to each other, wherein the main organic EL portion and the sub organic EL portion are hermetically sealed facing each other; and
forming a spacer member on at least one of facing surfaces of the main and sub organic EL display panels, the spacer member maintaining a gap between main and sub organic EL display panels and increasing the structural strength of the main and sub organic EL display panels;

characterised in that

the spacer member (150) is formed on and integrally with the insulation layer of the main or sub organic EL display panel (110,120).

16. The method according to claim 15, further comprising aging the main organic EL display panel and the sub organic EL display panel.
17. The method according to claim 15, or 16, further comprising providing an absorbing unit, the absorbing unit preventing moisture from infiltrating into the main and sub organic EL portions.
18. The method according to claim 17, wherein the absorbing unit is in the shape of a sheet.
19. The method according to any of claims 15 to 18 further comprising providing passivation layers, the passivation layers covering the main organic EL portion and the sub organic EL portion on the main sub-

strate and the sub substrate, respectively.

Patentansprüche

1. Organisches Elektrolumineszenzdisplay-, EL-, Bauelement vom Doppeltyp, das Folgendes umfasst:

ein organisches EL-Hauptdisplaypaneel (110) mit einem Hauptsubstrat (111) und einem auf dem Hauptsubstrat ausgebildeten organischen EL-Hauptabschnitt (112);
ein organisches EL-Teildisplaypaneel (120) mit einem Teilsubstrat (121) und einem auf dem Teilsubstrat ausgebildeten organischen EL-Teilabschnitt (122);
ein Abdichtglied (130), das das Hauptsubstrat und das Teilsubstrat zueinander abdichtet, wobei der organische EL-Hauptabschnitt und der organische EL-Teilabschnitt einander zugewandt hermetisch abgedichtet sind; und
ein Abstandshalterglied (150), das auf mindestens einer der zugewandten Oberflächen der organischen EL-Haupt- und Teilpaneele vorgesehen ist, wobei zwischen der organischen EL-Haupt- und Teildisplaypaneele ein Spalt aufrechterhalten wird und die strukturelle Festigkeit davon verstärkt wird;

dadurch gekennzeichnet, dass der organische EL-Hauptabschnitt (112) und der organische EL-Teilabschnitt (122) jeweils eine Isolationsschicht (114,124) umfassen, die ausgebildet ist, eine Elektrode (113,123) des jeweiligen organischen EL-Haupt- oder Teildisplaypaneels in einem vorbestimmten Muster zu exponieren, wodurch ein Pixel auf dem jeweiligen Haupt- oder Teilsubstrat ausgebildet wird, und das Abstandshalterglied (150) auf und integral mit der Isolationsschicht des organischen EL-Haupt- oder Teildisplaypaneels (110,120) ausgebildet ist.

2. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 1, wobei die Fläche des organischen EL-Hauptabschnitts (112) größer ist als die des organischen EL-Teilabschnitts (122).
3. Organisches EL-Bauelement vom Doppeltyp nach einem vorhergehenden Anspruch, weiterhin umfassend eine Absorbierereinheit (140), die verhindert, dass Feuchtigkeit in den organischen EL-Haupt- und Teilabschnitt eindringt, wobei die Absorbierereinheit in einem durch das Abdichtglied definierten abgedichteten Bereich vorgesehen ist.
4. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 3, wobei die Absorbierereinheit (140) ein Absorbens (142) in einer Ausnehmung (141) umfasst,

die in mindestens einem Abschnitt entweder des Hauptsubstrats oder des Teilsubstrats in dem durch das Abdichtglied definierten abgedichteten Bereich ausgebildet ist.

5. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 4, weiterhin umfassend ein poröses Band, das das Hinausfließen des Absorbens verhindert, wobei das poröse Band an dem Substrat mit der Ausnahme haftet. 5
6. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 3, 4 oder 5, wobei die Absorbierereinheit (140) in der Form einer Folie vorliegt. 10
7. Organisches EL-Bauelement vom Doppeltyp nach einem vorhergehenden Anspruch, weiterhin umfassend Passivierungsschichten (118,128), die den organischen EL-Hauptabschnitt und den organischen EL-Teilabschnitt bedecken, wobei die Passivierungsschichten auf dem Hauptsubstrat bzw. dem Teilsubstrat vorgesehen sind. 15
8. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 7, weiterhin umfassend eine Absorbensfolie, die zwischen den Passivierungsschichten vorgesehen ist. 20
9. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 7 oder 8, wobei die Passivierungsschichten (118,128) eng aneinander haften und durch das Abdichtglied an Kanten der Passivierungsschichten abgedichtet sind. 25
10. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 7, 8 oder 9, wobei die Passivierungsschichten (118,128) integral ausgebildet sind und durch das Abdichtglied an Kanten der Passivierungsschichten abgedichtet sind. 30
11. Organisches EL-Bauelement vom Doppeltyp nach einem vorhergehenden Anspruch, wobei das Hauptsubstrat (111) und/oder das Teilsubstrat (121) aus einem transparenten Material zum Durchlassen von von dem organischen EL-Hauptabschnitt ausgebildetem Licht hergestellt ist. 35
12. Organisches EL-Bauelement vom Doppeltyp nach Anspruch 11, wobei das transparente Material ein kontrastvergrößerndes dunkel getöntes Glas ist. 40
13. Organisches EL-Bauelement vom Doppeltyp nach einem vorhergehenden Anspruch, weiterhin umfassend eine Polarisationsplatte, die an einer äußeren Oberfläche des Hauptsubstrats und/oder des Teilsubstrats haftet. 45
14. Organisches Elektrolumineszenzdisplay- (EL-) Bau- 50

element vom Doppeltyp nach einem vorhergehenden Anspruch:

wobei das organische EL-Hauptdisplaypaneel folgendes umfasst:

ein transparentes Hauptsubstrat (111),

eine erste Elektrode, die auf dem transparenten Hauptsubstrat in einem ersten vorbestimmten Muster ausgebildet ist,

ein erstes Isolationsschichtmuster, das einen vorbestimmten Licht emittierenden Bereich definiert,

organische Schichten (112), die über der ersten Elektrode und der ersten Isolationsschicht in einem vorbestimmten Muster ausgebildet sind, wodurch der organische EL-Hauptabschnitt entsteht,

eine zweite Elektrode mit einem zweiten vorbestimmten Muster in einer Richtung orthogonal zu der ersten Elektrode und

wobei das organische Teildisplaypaneel Folgendes umfasst:

ein transparentes Teilsubstrat (121),

eine dritte Elektrode, die auf dem transparenten Teilsubstrat in einem dritten vorbestimmten Muster ausgebildet ist,

ein zweites Isolationsschichtmuster, das einen vorbestimmten Licht emittierenden Bereich definiert,

organische Schichten (122), die über der dritten Elektrode und der zweiten Isolationsschicht in einem vorbestimmten Muster ausgebildet sind, wodurch der organische EL-Teilabschnitt entsteht, und

eine vierte Elektrode mit einem vierten vorbestimmten Muster in einer Richtung orthogonal zu der dritten Elektrode.

15. Verfahren zum Herstellen eines organischen EL-Bauelementes vom Doppeltyp, wobei das Verfahren Folgendes umfasst:

Vorbereiten eines organischen EL-Hauptdisplaypaneels, was Folgendes umfasst:

Ausbilden einer ersten Elektrode auf einem transparenten Hauptsubstrat (111) in einem ersten vorbestimmten Muster,

Ausbilden einer ersten Isolationsschicht, die ausgebildet ist, die erste Elektrode in einem vorbestimmten Muster zu exponieren, wodurch ein Pixel auf dem jeweiligen Hauptsubstrat ausgebildet wird,

Ausbilden von organischen Schichten (121) über der ersten Elektrode und der ersten

Isolationsschicht in einem vorbestimmten Muster, wodurch der organische EL-Hauptabschnitt entsteht, und
 Ausbilden einer zweiten Elektrode mit einem zweiten vorbestimmten Muster in einer Richtung orthogonal zu der ersten Elektrode;

Vorbereiten eines organischen EL-Teildisplaypaneels; umfassend:

Ausbilden einer dritten Elektrode auf einem transparenten Teils substrat (121) in einem dritten vorbestimmten Muster,
 Ausbilden einer zweiten Isolationsschicht, die ausgebildet ist, die dritte Elektrode in einem vorbestimmten Muster zu exponieren, wodurch ein Pixel auf dem Teils substrat ausgebildet wird,
 Ausbilden von organischen Schichten (122) über der dritten Elektrode und der zweiten Isolationsschicht in einem vorbestimmten Muster, wodurch der organische EL-Teilabschnitt ausgebildet wird;
 Ausbilden einer vierten Elektrode mit einem vierten vorbestimmten Muster in einer Richtung orthogonal zu der dritten Elektrode;
 Abdichten des Hauptsubstrats und des Teils substrats zueinander, wobei der organische EL-Hauptabschnitt und der organische EL-Teilabschnitt einander zugewandt hermetisch abgedichtet sind; und
 Ausbilden eines Abstandshalterglieds auf mindestens einer von zugewandten Oberflächen der organischen EL-Haupt- und Teildisplaypaneele, wobei das Abstandshalterglied zwischen der organischen EL-Haupt- und Teildisplaypaneele einen Spalt aufrecht erhält und die strukturelle Festigkeit der organischen EL-Haupt- und Teildisplaypaneele erhöht;
dadurch gekennzeichnet, dass das Abstandshalterglied (150) auf und integral mit der Isolationsschicht des organischen EL-Haupt- oder Teildisplaypaneels (110,120) ausgebildet wird.

16. Verfahren nach Anspruch 15, weiterhin umfassend das Altern des organischen EL-Hauptdisplaypaneels und des organischen EL-Teildisplaypaneels.

17. Verfahren nach Anspruch 15 oder 16, weiterhin umfassend das Bereitstellen einer Absorbierereinheit, wobei die Absorbierereinheit verhindert, dass Feuchtigkeit in den organischen EL-Haupt- und Teilabschnitt eindringt.

18. Verfahren nach Anspruch 17, wobei die Absorbier-

ereinheit in der Form einer Folie vorliegt.

19. Verfahren nach einem der Ansprüche 15 bis 18, weiterhin umfassend das Bereitstellen von Passivierungsschichten, wobei die Passivierungsschichten den organischen EL-Hauptabschnitt und den organischen EL-Teilabschnitt auf dem Hauptsubstrat bzw. dem Teils substrat bedecken.

Revendications

1. Dispositif d'affichage électroluminescent EL organique double comprenant :

un panneau d'affichage EL organique principal (110) comportant un substrat principal (111) et une portion EL organique principale (112) formée sur le substrat principal ;
 un panneau d'affichage EL organique secondaire (120) comportant un substrat secondaire (121) et une portion EL organique secondaire (122) formée sur le substrat secondaire ;
 un organe de scellement (130) scellant le substrat principal et le substrat secondaire l'un à l'autre, dans lequel la portion EL organique principale et la portion EL organique secondaire sont scellées hermétiquement en se faisant face l'une l'autre ; et
 un organe espaceur (150), disposé sur au moins l'une des surfaces se faisant face des panneaux EL organiques principal et secondaire, maintenant un espacement entre les panneaux d'affichage EL organiques principal et secondaire et augmentant leur résistance structurelle ;

caractérisé en ce que la portion EL organique principale (112) et la portion EL organique secondaire (122) comprennent chacune une couche d'isolation (114, 124) formée pour exposer une électrode (113, 123) du panneau d'affichage EL organique principal ou secondaire respectif selon un motif prédéterminé formant un pixel sur le substrat principal ou secondaire respectif, et l'organe espaceur (150) est formé sur et solidairement à la couche d'isolation du panneau d'affichage EL organique principal ou secondaire (110, 120).

2. Dispositif EL organique double selon la revendication 1, dans lequel l'aire de la portion EL organique principale (112) est supérieure à celle de la portion EL organique secondaire (122).

3. Dispositif EL organique double selon l'une quelconque des revendications précédentes, comprenant en outre une unité absorbante (140) empêchant l'humidité de s'infiltrer dans les portions EL organiques principale et secondaire, l'unité absorbante étant

disposée dans une aire scellée définie par l'organe de scellement.

4. Dispositif EL organique double selon la revendication 3, dans lequel l'unité absorbante (140) comprend un absorbant (142) dans un évidement (141) formé dans au moins une portion du substrat principal ou du substrat secondaire dans l'aire scellée définie par l'organe de scellement. 5
5. Dispositif EL organique double selon la revendication 4, comprenant en outre une bande poreuse empêchant l'écoulement de l'absorbant, dans lequel la bande poreuse est mise à adhérer sur le substrat comportant l'évidement. 10
6. Dispositif EL organique double selon la revendication 3, 4 ou 5, dans lequel l'unité absorbante (140) a la forme d'une feuille. 15
7. Dispositif EL organique double selon l'une quelconque des revendications précédentes, comprenant en outre des couches de passivation (118, 128) recouvrant la portion EL organique principale et la portion EL organique secondaire, dans lequel les couches de passivation sont disposées sur le substrat principal et le substrat secondaire, respectivement. 20
8. Dispositif EL organique double selon la revendication 7, comprenant en outre une feuille absorbante disposée entre les couches de passivation. 25
9. Dispositif EL organique double selon la revendication 7 ou 8, dans lequel les couches de passivation (118, 128) sont mises à adhérer l'une à l'autre étroitement, et sont scellées par l'organe de scellement sur les bords des couches de passivation. 30
10. Dispositif EL organique double selon la revendication 7, 8 ou 9, dans lequel les couches de passivation (118, 128) sont formées solidairement, et scellées par l'organe de scellement sur les bords des couches de passivation. 35
11. Dispositif EL organique double selon l'une quelconque des revendications précédentes, dans lequel au moins l'un du substrat principal (111) et du substrat secondaire (121) est constitué d'un matériau transparent permettant d'émettre de la lumière formée par la portion EL organique principale. 40
12. Dispositif EL organique double selon la revendication 11, dans lequel le matériau transparent est un verre teinté sombre d'augmentation de contraste. 45
13. Dispositif EL organique double selon l'une quelconque des revendications précédentes, comprenant en outre une plaque de polarisation mise à adhérer 50

sur une surface externe d'au moins l'un du substrat principal et du substrat secondaire.

14. Dispositif d'affichage électroluminescent (EL) organique double selon l'une quelconque des revendications précédentes :

dans lequel le panneau d'affichage EL organique principal comprend :

un substrat principal transparent (111),
une première électrode formée sur le substrat principal transparent selon un premier motif prédéterminé,
un motif de première couche d'isolation définissant une aire d'émission de lumière prédéterminée,
des couches organiques (112) formées sur la première électrode et la première couche d'isolation selon un motif prédéterminé formant la portion EL organique principale,
une deuxième électrode ayant un deuxième motif prédéterminé dans une direction orthogonale à la première électrode ; et
le panneau d'affichage EL organique secondaire comprend :

un substrat secondaire transparent (121),
une troisième électrode formée sur le substrat secondaire transparent selon un troisième motif prédéterminé,
un motif de seconde couche d'isolation définissant une aire d'émission de lumière prédéterminée,
des couches organiques (122) formées sur la troisième électrode et la seconde couche d'isolation selon un motif prédéterminé formant la portion EL organique secondaire, et
une quatrième électrode ayant un quatrième motif prédéterminé dans une direction orthogonale à la troisième électrode.

15. Procédé de fabrication d'un dispositif EL organique double, le procédé comprenant :

la préparation d'un panneau d'affichage EL organique principal, comprenant :

la formation d'une première électrode sur un substrat principal transparent (111) selon un premier motif prédéterminé,
la formation d'une première couche d'isolation formée pour exposer la première électrode selon un motif prédéterminé de façon à former un pixel sur le substrat principal,

la formation de couches organiques (121) sur la première électrode et la première couche d'isolation selon un motif prédéterminé formant la portion EL organique principale, et
la formation d'une deuxième électrode ayant un deuxième motif prédéterminé dans une direction orthogonale à la première électrode ;

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la préparation d'un panneau d'affichage EL organique secondaire, comprenant :

la formation d'une troisième électrode sur un substrat secondaire transparent (121) selon un troisième motif prédéterminé, la formation d'une seconde couche d'isolation formée pour exposer la troisième électrode selon un motif prédéterminé de façon à former un pixel sur le substrat secondaire, la formation de couches organiques (122) sur la troisième électrode et la seconde couche d'isolation selon un motif prédéterminé formant la portion EL organique secondaire, la formation d'une quatrième électrode ayant un quatrième motif prédéterminé dans une direction orthogonale à la troisième électrode ;

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le scellement du substrat principal et du substrat secondaire l'un à l'autre, la portion EL organique principale et la portion EL organique secondaire étant scellées hermétiquement en se faisant face l'une l'autre ; et la formation d'un organe espaceur sur au moins l'une des surfaces se faisant face des panneaux d'affichage EL organiques principal et secondaire, l'organe espaceur maintenant un espacement entre les panneaux d'affichage EL organiques principal et secondaire et augmentant la résistance structurelle des panneaux d'affichage EL organiques principal et secondaire ;

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caractérisé en ce que l'organe espaceur (150) est formé sur et solidairement à la couche d'isolation du panneau d'affichage EL organique principal ou secondaire (110, 120).

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16. Procédé selon la revendication 15, comprenant en outre le vieillissement du panneau d'affichage EL organique principal et du panneau d'affichage EL organique secondaire.

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17. Procédé selon la revendication 15 ou 16, comprenant en outre la disposition d'une unité absorbante, l'unité absorbante empêchant l'humidité de s'infiltrer dans les portions EL organiques principale et secondaire.

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18. Procédé selon la revendication 17, dans lequel l'unité absorbante a la forme d'une feuille.

19. Procédé selon l'une quelconque des revendications 15 à 18, comprenant en outre la disposition de couches de passivation, les couches de passivation recouvrant la portion EL organique principale et la portion EL organique secondaire sur le substrat principal et le substrat secondaire, respectivement.

FIG. 1 (PRIOR ART)

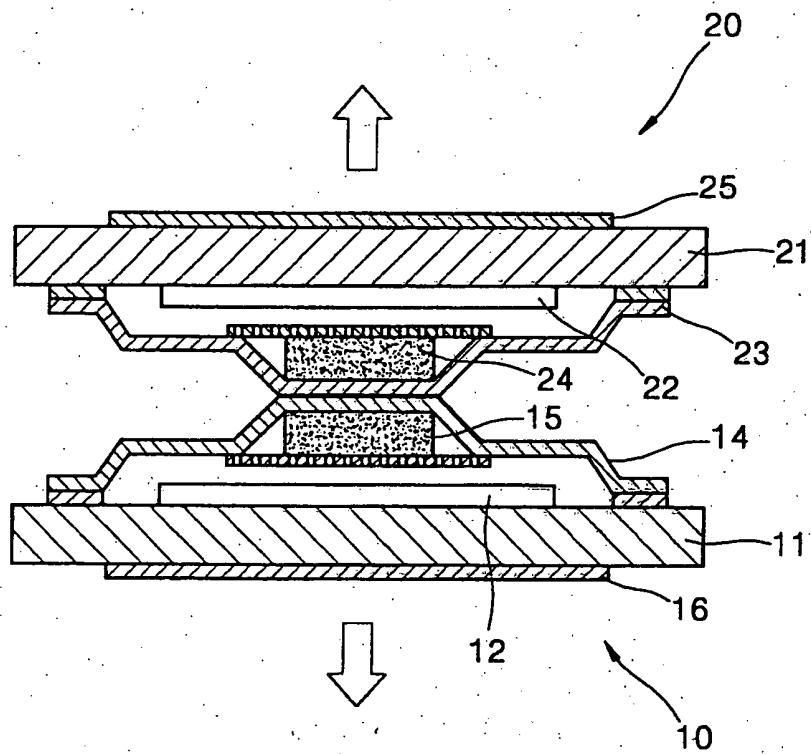


FIG. 2 (PRIOR ART)

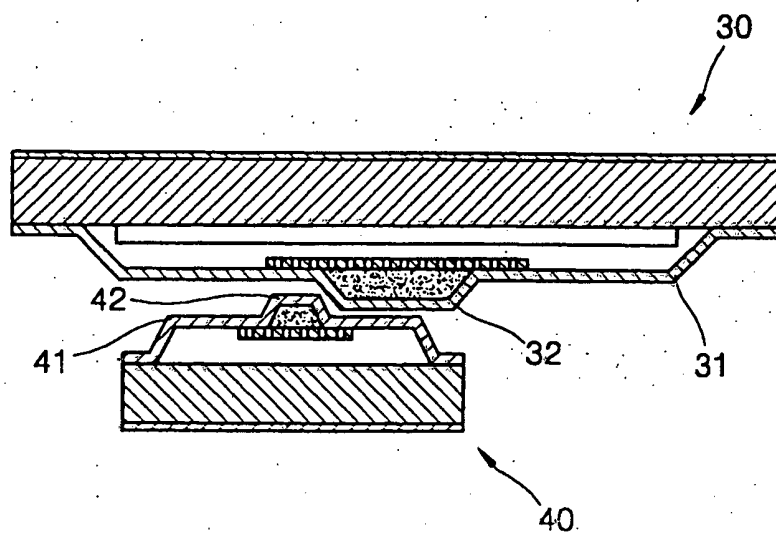


FIG. 3 (PRIOR ART)

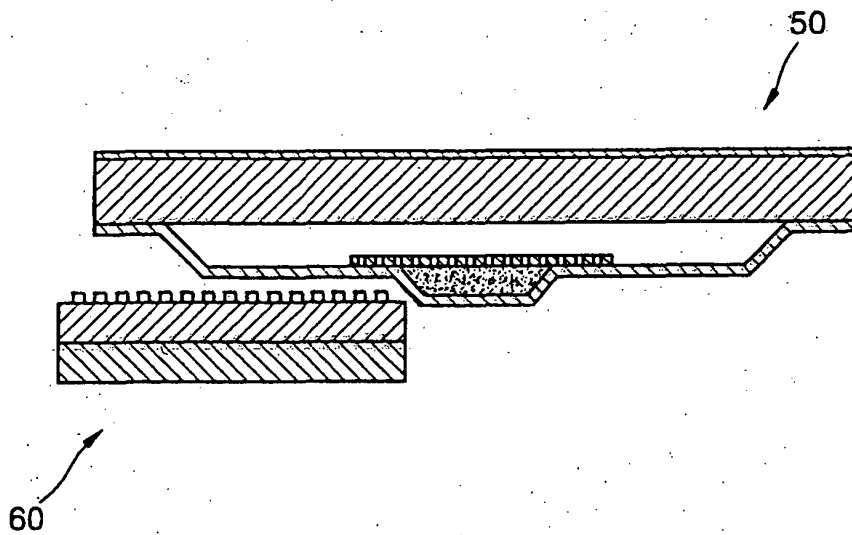


FIG. 4

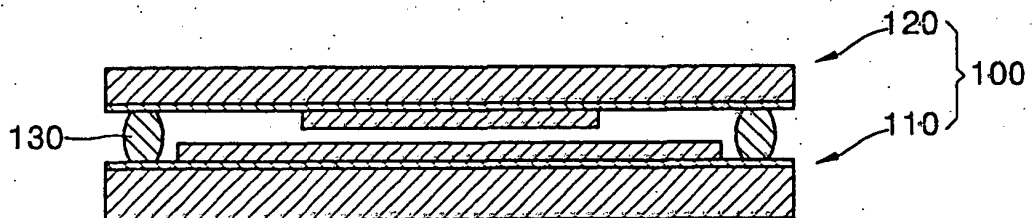


FIG. 5

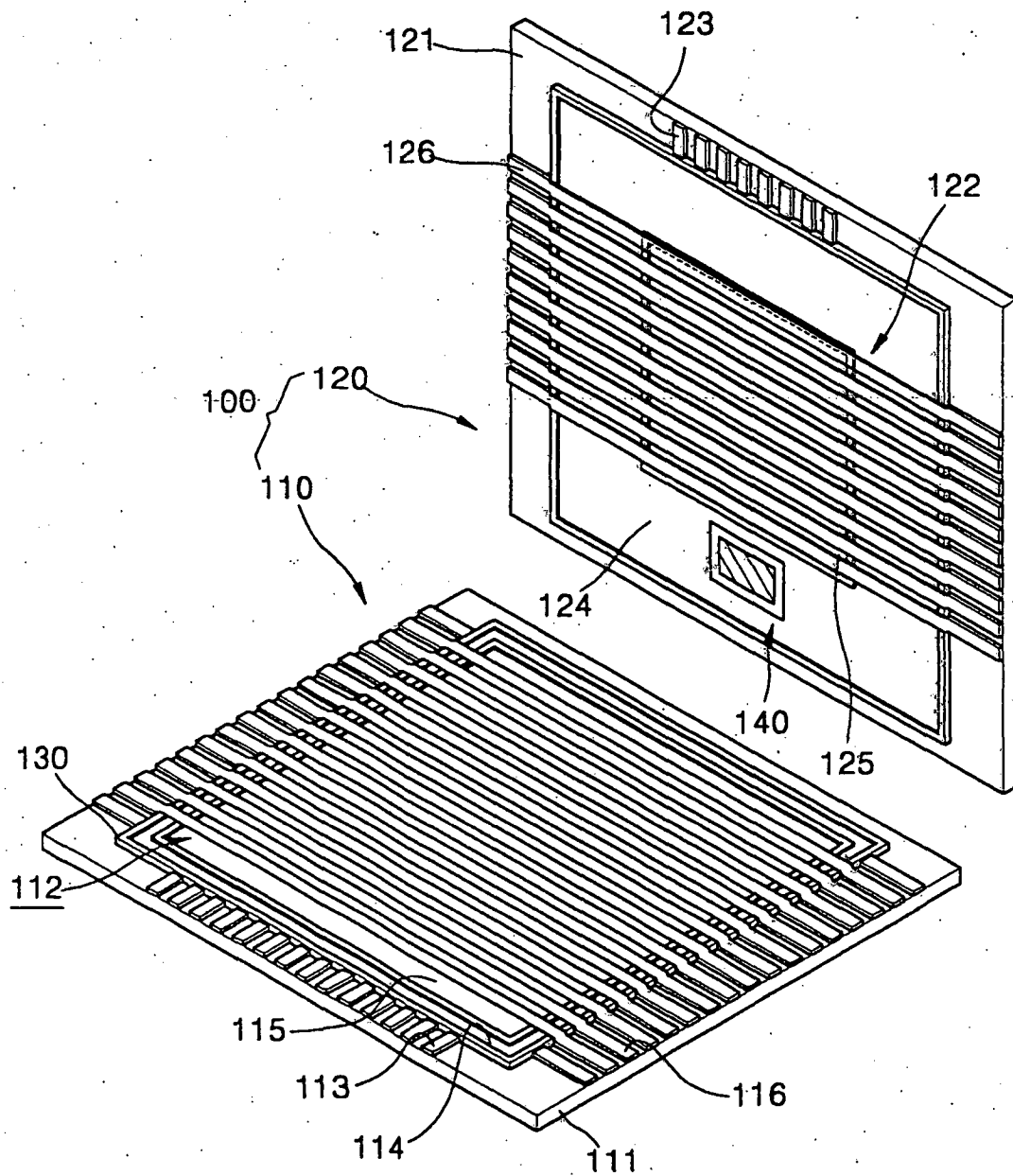


FIG. 6

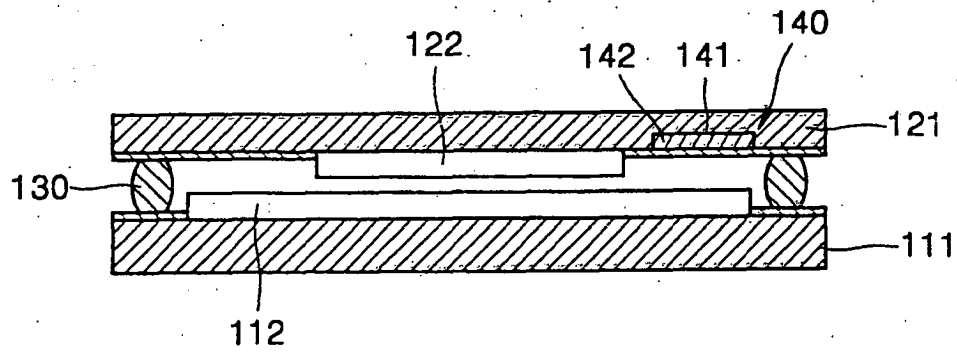


FIG. 7

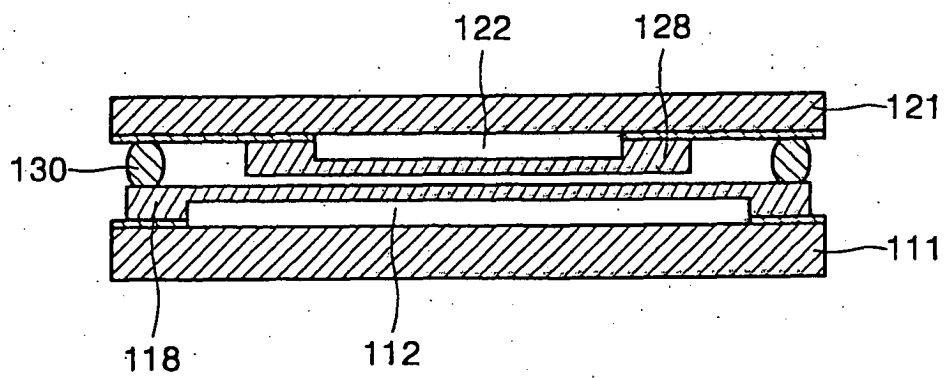


FIG. 8

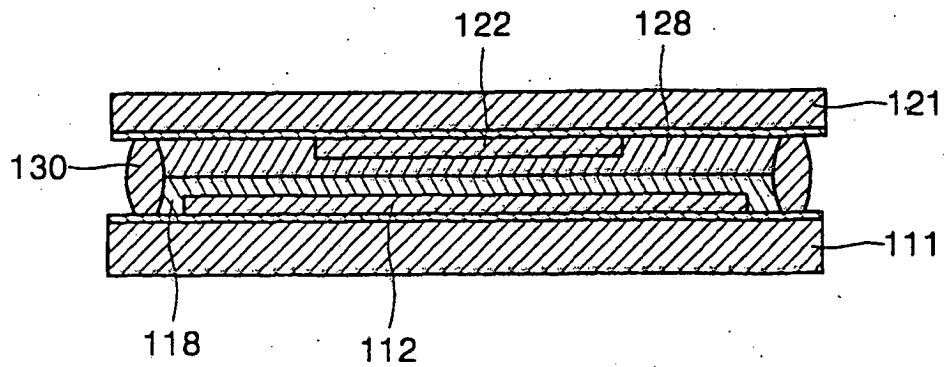


FIG. 9

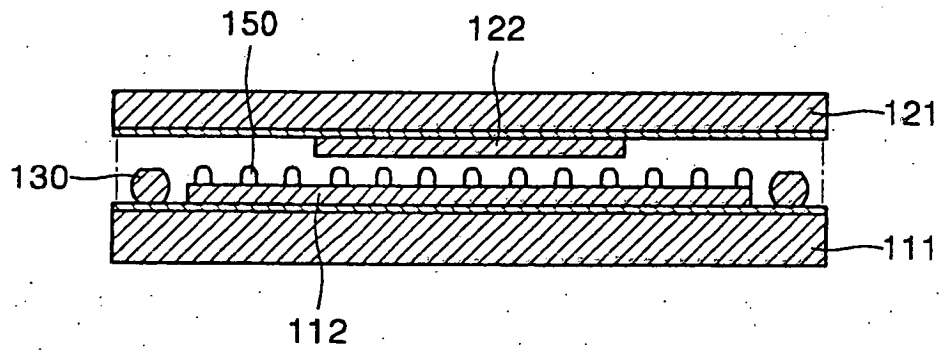


FIG. 10

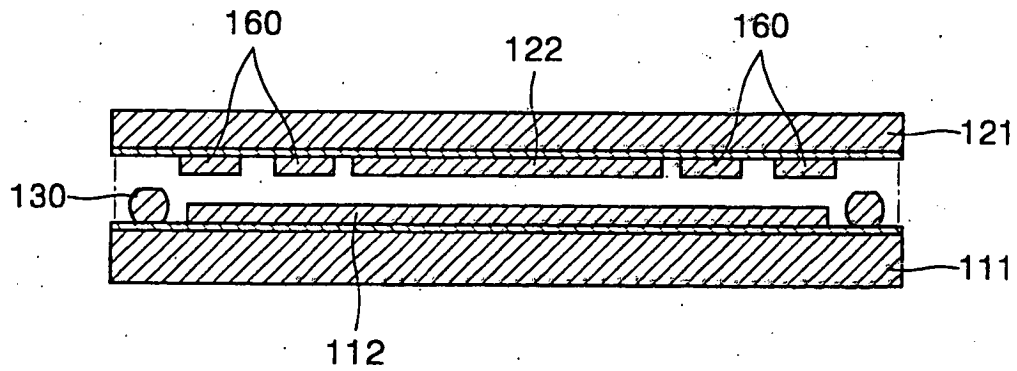
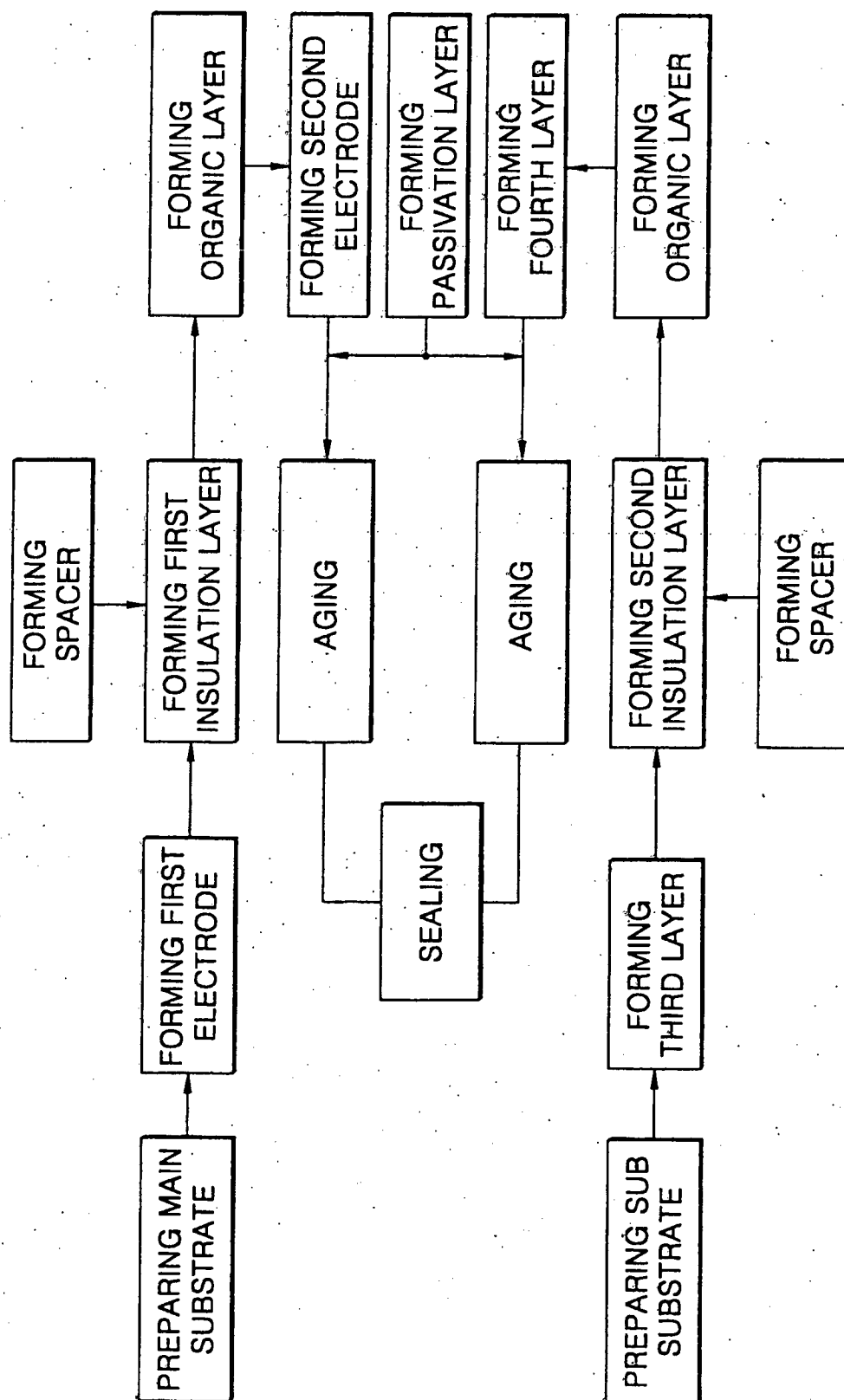


FIG. 11



REFERENCES CITED IN THE DESCRIPTION

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专利名称(译)	双型有机电致发光显示装置及其制造方法		
公开(公告)号	EP1391945B1	公开(公告)日	2012-09-26
申请号	EP2003254625	申请日	2003-07-23
[标]申请(专利权)人(译)	三星NEC移动显示器		
申请(专利权)人(译)	三星NEC移动显示CO.LTD.		
当前申请(专利权)人(译)	三星DISPLAY CO. , LTD.		
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发明人	KIM, HYUNG WOOK KIM, TAE SEUNG		
IPC分类号	H01L51/52 H01L27/32 H05B33/12 G09F9/30 G09F9/40 H01L51/50 H05B33/04 H05B33/10 H05B33/22		
CPC分类号	H01L25/048 H01L27/3286 H01L51/525 H01L51/5253 H01L51/5259 H01L2924/0002		
优先权	1020020043271 2002-07-23 KR		
其他公开文献	EP1391945A3 EP1391945A2		
外部链接	Espacenet		

摘要(译)

双型有机EL器件及其制造方法。双型有机电致发光显示 (EL) 器件包括：主有机EL显示板，具有主基板和形成在主基板上的主有机EL部分；子有机EL显示板，具有子基板和子有机EL部分形成在子基板上的密封构件和将主基板和子基板彼此密封的密封构件，其中主有机EL部分和子有机EL部分彼此面对地气密密封。

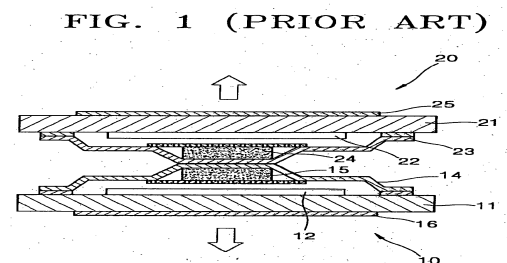


FIG. 2 (PRIOR ART)

