(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 693 908 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.02.2018 Bulletin 2018/08

(51) Int Cl.:
H01L 51/52 *(2006.01)* ***H01L 27/32*** *(2006.01)*

(21) Application number: **06003607.6**

(22) Date of filing: **22.02.2006**

(54) **Organic electroluminescence display and method for manufacturing the same**

Organische elektrolumineszente Vorrichtung und Herstellungsverfahren dafür

Dispositif organique électroluminescent et sa méthode de fabrication

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

(30) Priority: **22.02.2005 KR 2005014475**

(43) Date of publication of application:
23.08.2006 Bulletin 2006/34

(73) Proprietor: **LG Display Co., Ltd.**
Seoul, 07336 (KR)

(72) Inventors:
- **KIM, Chang Nam**
  Seoul 131-120 (KR)
- **HAN, Young Soo**
  Gangnam-gu
  Seoul 136-966 (KR)
- **LEE, Ho Nyun**
  Seongnam-si
  Gyeonggi-Do 463-772 (KR)
- **CHUNG, Jin Won**
  Seoul 136-082 (KR)
- **KIM, Hong Gyu**
  Uiwang-si
  Gyeonggi-do 437-741 (KR)

(74) Representative: **Ter Meer Steinmeister & Partner**
Patentanwälte mbB
Nymphenburger Straße 4
80335 München (DE)

(56) References cited:
EP-A2- 0 971 564
JP-A- 2003 100 447
JP-A- 2003 272 856
JP-A- 2004 186 045
US-A1- 2001 026 835

EP 1 693 908 B1

Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an organic electroluminescence (EL) device, and more particularly, to an organic EL device, which has a heat dissipation structure to dissipate heat generated upon driving of the organic EL device and heat from a thin film transistor (TFT) on a substrate thereof.

Discussion of the Related Art

[0002] Generally, an organic EL device is a device which employs electroluminescence of an organic material, and has been spotlighted as a light emitting device capable of emitting light of high brightness while being driven by low voltage direct current, in which an organic light emitting layer or an organic hole transfer layer is stacked between an upper electrode and a lower electrode.

[0003] FIGs. 1A and 1B are a cross-sectional view and a plan view illustrating a conventional organic EL device, in particular, a conventional Active matrix bottom emission type organic EL device, respectively.

[0004] As shown in FIGs. 1A and 1B, the organic EL device comprises: a transparent substrate 10 which is composed of ITO and has a TFT 10' and a first electrode 10" formed thereon; at least one organic material layer 11 which comprises a hole injection layer, a hole transfer layer, a light emitting layer, an electron transfer layer, etc.; a second electrode 12 for injection of electrons and reflection of emitted light; a sealant 13 for sealing the components; and a seal-cup 14.

[0005] When + and - direct voltage is applied to the first electrode 10" and the second electrode 12 of the Active matrix bottom emission type organic EL device constructed as described above, holes injected from the first transparent electrode 10" transfer to the light emitting layer through the hole transfer layer of the organic material layer 11. In addition, electrons injected from the second electrode 12 transfer to the light emitting layer through the electron transfer layer. As a result, combination of the holes and the electrons occurs in the light emitting layer so that light is emitted through the transparent substrate made of ITO. In order to prevent cell shrinkage in the organic EL device due to moisture in atmosphere, the organic EL device is sealed by the sealant 13 and the seal-cup 14 in N2 atmosphere, so that the moisture in the atmosphere is prevented from penetrating into the device. In most cases, the second electrode 12 is deposited inside a sealing line 13' which is on an active region, and used as a common electrode.

[0006] In such an active matrix bottom emission type organic EL device, heat generating regions can be generally divided into the TFT 10' which is formed on the substrate, and the organic material layer 11 of the organic EL device. At this time, the generated heat can be dissipated from the device to the outside thereof via heat conduction through a line for supplying electric power, and the glass substrate through which light is emitted, and via convection of gas existing between the second electrode 12 and the seal-cup 14 of the organic EL device.

[0007] However, the conventional organic EL device as described above has disadvantages in that an increase in width of the line results in reduction of an aperture ratio, in that the glass substrate causes ineffective heat transfer, and in that nitrogen occupying most portions of the gas is not conducive to dissipation of heat due to its significantly low heat conductivity. As such, the heat is not dissipated to the outside, and increases an interior temperature of the device, causing degradation in performance of the TFT, deposition of the organic material, and degradation in interface properties between the organic material and the electrode. As a result, the conventional organic EL device has problems of instability and reduced lifetime. In this point of view, there is a need in the art to provide an effective dissipation system in the organic EL device.

[0008] JP 2003 272856 A discloses a display device comprising a first substrate and a plurality of display elements composed of a plurality of transparent pixel electrodes arranged at one main surface side of the first substrate. Common electrodes face the plurality of transparent pixel electrodes, and light modulation layers are interposed between the plurality of transparent pixel electrodes and the common electrodes. A second substrate faces the main surface of the first substrate and a sealing member is interposed between an array substrate and the second substrate to separate the plurality of display elements from external space. The main surface of the first substrate is partially exposed to the external space, and the common electrode is extended so as to cover at least part of the exposed part. JP 2003 100447 A discloses organic electroluminescence equipment comprising a high sealing resin layer and a high heat-conductivity resin layer formed in a gap of a glass substrate and a sealing substrate in the perimeter part of the sealing substrate. Among this, the high heat-conductivity resin layer is formed in a portion, which a negative electrode side leader line crosses. The high sealing resin layer is formed in a sealing domain except the above portion and its narrow vicinity. The high heat-conductivity resin layer is constituted with an electric insulation filler intermingled to a UV hardening resin of an epoxy system. JP 2004 186045 A discloses an organic EL panel comprising a sealant to seal a element substrate and a sealing substrate. A common negative electrode formed on the sealing substrate is connected to the sealant, and as for the sealing substrate, its surface is covered by a metal film. Therefore, the heat of the cathode is transmitted to the metal film, and effective heat-discharge is carried out. EP 0 971 564 A2 discloses an organic electroluminescent display panel. The organic EL display panel comprises a substrate having an anode electrode arranged on an active region, an organic EL-medium formed on the anode electrode and cathode electrodes formed on the organic EL-medium. The anode electrode and the cathode electrodes are connected to respective metallized leaders each of which comprises a patterned seal zone and a bond pad zone. A protective cover faces the cathode electrodes while being sealingly connected with the substrate or the patterned seal zones via a perimeter seal. The protective cover is constructed from optically opaque metals. The bond pad zones are arranged outside the seal and are connected with electrical connectors.

SUMMARY OF THE INVENTION

[0009] Accordingly, the present invention is directed to an organic EL device and a method for manufacturing the same that substantially obviate one or more problems due to limitations and disadvantages of the related art.

[0010] It is an object of the present invention to provide an organic EL device, which has a heat dissipation structure to dissipate heat generated upon driving of the organic EL device and heat from a thin film transistor (TFT) on a substrate thereof, and a method for manufacturing the same.

[0011] 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.

[0012] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided an organic EL device and a method for manufacturing thereof according to the independent claims. Advantageous embodiments are described in the dependent claims.

[0013] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] 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 embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

FIGs. 1A and 1B are a cross-sectional view and a plan view schematically illustrating a conventional organic EL device;

FIGs. 2A and 2B are a cross-sectional view and a plan view schematically illustrating an organic EL device in accordance with a first embodiment of the present invention;

FIG. 2C is a cross-sectional view schematically illustrating an organic EL device in accordance with an example not forming part of the present invention

FIG. 2D is a cross-sectional view schematically illustrating an organic EL device in accordance with a second embodiment of the present invention;

FIG. 3 is an enlarged view of Part B shown in FIG. 2B;

FIG. 4 is an enlarged view of Part A shown in FIG. 2A;

FIGs. 5A and 5B are views illustrating shadow masks; and

FIG. 6 is a plan view illustrating a negative electrode formed using the shadow masks of FIGs. 5A and 5B.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0016] FIGs. 2A and 2B are a cross-sectional view and a plan view schematically illustrating an organic EL device in accordance with a first embodiment of the present invention.

[0017] Referring to FIGs. 2A and 2B, the organic EL device of the first embodiment comprises: a transparent substrate 10 which is composed of a transparent material such as ITO, and has a matrix-shaped TFT 10' and a first electrode 10" disposed on an active region thereon; at least one organic material layer 11 which is formed in the active region on the first electrode 10" such that holes and electrons are injected to the organic material layer 11, and then combined therein to emit light therethrough; a second electrode 15 formed over the organic material layer 11 and extending to an inactive region outside a seal line; a seal-cup 14 facing the second electrode 15; a sealant 13 formed to seal a periphery of the seal-cup 14 and the seal line of the second electrode 15; and a heat conductor 16 connecting the second electrode 15 of the inactive region outside the seal line with the seal-cup to dissipate heat of the organic EL device to an outside thereof.

[0018] The first electrode 10" is preferably transparent. As in the conventional organic EL device, the organic material layer 11 is composed of at least one organic material layer, and typically comprises a hole injection layer, a hole transfer layer, a light emitting layer, and a electron transfer layer.

[0019] After forming the active matrix substrate 10 comprising the TFT 10' and the first electrode 10", the organic material layer 11 is deposited thereon by the same process as that of the conventional method for manufacturing the organic EL device.

[0020] Then, the second electrode 15 is formed using shadow masks as shown in FIGs. 5A and 5B. Specifically, the second electrode 15 is formed using a shadow mask C through which a second electrode 17' corresponding to a wider region than a shadow mask generally used when forming an electrode, i.e., the active region, and a second electrode 17" corresponding to an inactive region outside the seal line are perforated, as shown in FIG. 5A, and a shadow mask D through which stripe-shaped openings 18 having a predetermined width are formed at predetermined spacing on a portion corresponding to the seal line, as shown in FIG. 5B. Then, as shown in FIG. 6, a stripe-shaped heat conductor 15"' is formed on the seal line to connect the second electrode 15" of the inactive region with the second electrode 15' of the active region, in which stripes of the heat conductor have a predetermined line-width, and are separated a predetermined distance from each other. Such a structure of the second electrode as described above is attributed to the fact that, if the seal-cup 14 is made of SUS, an opaque material, in a subsequent process, the sealant cannot be cured by radiating UV rays in a direction opposite to a light emitting direction from the device, that is, by radiating UV rays from above the seal-cup 14, and thus it is necessary for the a second electrode to have the structure for allowing the UV rays to reach the sealant. In addition, according to the present invention, the second electrode 15" of the inactive region is connected to the second electrode 15' of the active region using the shadow mask of FIG. 5B, which is formed with stripes arranged at a space of, for example, 100 μm and having a width of, for example, 100 μm as indicated by 15 "'in FIG. 6. On the other hand, in an example not forming part of the present invention, if the seal-cup is made of a transparent material such as glass, it is advantageous in terms of a manufacturing process to form the second electrodes 15' and 15" integrally. Although one side of the second electrode 15" on the inactive region is schematically illustrated in FIGs. 5A, 5B and 6, it is more preferable that the second electrode 15" of the inactive region be formed over an entire surface of the substrate excluding a TAB line as shown in FIG. 2B. In addition, since the second electrode 15' of the active region is provided with the organic material layer 11 therebelow, it is preferable that the second electrode 15' has a height taller than that of the second electrode 15" of the inactive region.

[0021] The second electrode 15 may be composed of a single layer, or two or more layers in order to effectively enhance thermal conductivity. As for a material for the second electrodes, a material having a high thermal conductivity is advantageous. For example, the second material may comprises 1) MgAl alloys, pure Al, or alloys formed by adding at least one of Nd, Ta, Nb, Mo, W, Ti, Si, B and Ni in a ratio of 5 at.% to Al, or 2) pure Cu, pure Ag, or alloys formed by adding at least one of Au, Cu, Nd, Al, Sn, Mg, Ti, Pt, Pd and Ni in a ratio of 5 at.% to Cu or Al.

[0022] Then, as in the conventional method, the seal-cup 14 is formed of SUS, and a sealant material is applied to a periphery of the seal-cup 14 corresponding to the seal line of the second electrode 15, followed by radiating UV rays thereto, thereby sealing the organic EL device. Next, the second electrode 15" of the inactive region and the seal-cup 14 are connected by the heat conductor 16 (see FIG. 4). If the seal-cup 14 is made of a conductive material, it is more effective in terms of heat dissipation, but since the seal-cup 14 electrically contacts the second electrode exposed to the outside, the seal-cup may affect other components or vice versa. Accordingly, the second electrode 15" of the inactive region is insulated by applying an insulation tape thereto or by coating an insulation material thereon, thereby minimizing effect on the seal-cup due to electric contact between the second electrode and an outer component.

[0023] FIG. 2C is a cross-sectional view schematically illustrating an organic EL device in accordance with an example not forming part of the present invention.

[0024] The organic EL device has the same construction as that of the first embodiment, excluding the structure that a second electrode 15 is formed only on an active region inside a seal line, and a heat conductive layer 20 is formed on the seal line to connect the second electrode 15 with the heat conductor 16.

[0025] FIG. 2D is a cross-sectional view schematically illustrating an organic EL device in accordance with a second embodiment of the present invention.

[0026] The organic EL device of the second embodiment has the same construction as that of the first embodiment, excluding the structure that a second electrode 15 is formed only on an active region inside a seal line, and a heat conductor 16 is formed to a region inside the seal line. As a result, the heat conductor 16 connects an edge of the second electrode inside the seal line with the seal-cup 14.

[0027] A method of manufacturing an organic EL device in accordance with the present invention will be described in detail as follows.

[0028] A method of manufacturing an organic EL device in according to a first embodiment of the present invention will be described as follows.

[0029] According to this embodiment, an organic EL device having a size of 1" is formed by depositing an organic material layer 11 and a second electrode 15 on a substrate 10 using a resistance heating method, in which the substrate 10 formed of ITO has a thickness of 150 nm, and comprises a TFT 10' and a first electrode 10" formed thereon. At this time, when depositing the second electrode, a second electrode 15" is formed to an inactive region outside a seal line 13' using shadow masks (see FIGs. 3, 5A and 5B) having wider areas than an active region. The second electrode 15 is shown as being formed on the active region indicated by 15' and the inactive region indicated by 15". The second electrode is made of Al, and has a thickness of 200 nm. After manufacturing the device, sealing is performed in N_2 atmosphere, and at this time, a seal-cup 14 is made of SUS. Here, the second electrode 15' of the active region is connected with the second electrode 15" exposed to the inactive region by a stripe-shaped connecting portion, that is, by using the shadow mask as shown in FIG. 5B, on a seal line for curing a sealant 13 (see FIG. 3), in which stripes of the connecting portion have a width of 10 ~ 500 μm, and are separated a distance of 10 ~ 500 μm from each other. This structure is attributed to the fact that the seal-cup 14 is made of opaque SUS. That is, this structure is provided for the purpose of allowing the sealant to be cured by UV rays radiated from below the second electrode, from which light is emitted, when sealing in the subsequent process as mentioned above. The connecting portion between the second electrode 15' of the active region and the second electrode 15" of the inactive region is not limited to the stripe shape, but may have other shapes. However, it is necessary for the connecting portion to have a space formed thereon so as to allow the UV light to be radiated therethrough.

[0030] The second electrode exposed to the inactive region of the outside is formed on four sides of the substrate excluding a region where the TAB line is formed, and heat is dissipated through the second electrode exposed to the outside, so that temperature is reduced during driving of the device. In order to remove any effect between the second electrode exposed to the outside and electric components outside the device, an insulation material is coated on the second electrode exposed to the outside and the SUS-cup. As for a coating method, it is preferable to attach an insulation tape thereto. After attaching a polarization film to the organic EL device, the organic EL device was operated with white light of 200 cd/m^2 at 0.31 and 0.33 on the chromaticity diagram. As a result, compared with 52 °C of the conventional organic EL device (in the case where the second electrode exists only on an active region of the seal line), the organic EL device of the first embodiment was reduced in temperature to 48 °C, and it was presumed that the interior temperature of the device would be further reduced. In addition, it was confirmed that the organic EL device having the second electrode exposed to an outer portion of the seal line had its lifetime increased 15 % or more than that of the conventional organic ED device.

[0031] A method of manufacturing an organic EL device according to a second embodiment will be described as follows.

[0032] The method of the second embodiment has the same steps as those of the first embodiment except that, after preceding steps, a heat conductor 16 is formed using a silver paste, which thermally connects a seal-cup 14 with a second electrode 15" of an inactive region outside a seal line as shown in FIG. 2A. After attaching a polarization film to the organic EL device formed as described above, the organic EL device was operated with white light of 200 cd/m^2 at 0.31 and 0.33 on the chromaticity diagram. As a result, compared with 52 °C of the conventional organic EL device, the organic EL device of the second embodiment was reduced in temperature to 42 °C, and it was presumed that the interior temperature of the device would be further reduced. Further, it was confirmed that, as the device was enhanced in stability by allowing heat to be effectively dissipated from the device, the organic EL device of the second embodiment had its lifetime increased 70 % or more of that of the conventional organic ED device.

[0033] A method of manufacturing an organic EL device according to an example not forming part of the present invention will be described as follows.

[0034] The method has the same steps as those of the second embodiment. As an exception, the seal-cup 14 is made of a glass, a transparent insulator instead of SUS, an opaque metal, a second electrode of a seal line is integrally formed with a second electrode 15" of an inactive region outside the seal line without the stripe-shaped connecting portion, and an insulation tape is attached to a portion of the second electrode 15" to which a silver paste is applied.

[0035] The reason for integrally forming the second electrode on the seal line instead of using the stripe-shaped connecting portion is that, since the seal-cup is made of the transparent glass, it is possible to cure a sealant by radiating UV rays from a side opposite to a side through which light is emitted, that is, from above a seal-cup without the stripe-shaped connecting portion which has a complicated structure. In addition, since the seal-cup itself is made of the glass as an insulator whereas the second electrode is an electrical conductor, it is not necessary to additionally attach the insulation tape to a portion to which a silver paste of the seal-cup is applied, and the insulation tape is attached only to the portion of the second electrode 15" to which the silver paste is applied.

[0036] After attaching a polarization film to the organic EL device formed by the method as described above, the organic EL device was operated with white light of 200 cd/m^2 at 0.31 and 0.33 on the chromaticity diagram. As a result, compared with 52 °C of the conventional organic EL device, the organic EL device was reduced in temperature to 46 °C, and it was presumed that the interior temperature of the device would be further reduced. In addition, it was confirmed that, as the device was enhanced in stability by allowing heat to be effectively dissipated from the device having the second electrode exposed to the outside, the organic EL device had its lifetime increased 40 % or more than that of the conventional organic ED device.

[0037] A method of manufacturing an organic EL device according to a third embodiment will be described as follows.

[0038] The method of the third embodiment has substantially the same steps as those of the second embodiment. As an exception, in the method according to the third embodiment, the second electrode is deposited in a multiple layers rather than a single Al layer in order to enhance heat conductivity in such a way that an Al layer is first deposited to have a thickness of 100 nm using a shadow mask, and then Cu is deposited to have a thickness of 200 nm on the Al layer.

[0039] After attaching a polarization film to the organic EL device formed by the method of the third embodiment as described above, the organic EL device was operated with white light of 200 cd/m^2 at 0.31 and 0.33 on the chromaticity diagram. As a result, compared with 52 °C of the conventional organic EL device, the organic EL device was reduced in temperature to 41 °C, and it was presumed that the interior temperature of the device would be further reduced. In addition, it was confirmed that, as the device was enhanced in stability by allowing heat to be effectively dissipated from the device via the second electrode exposed to the outside and the structure of connecting the second electrode exposed to the outside with the seal-cup by use of the heat conductor, the organic EL device of the third embodiment had its lifetime increased 75 % or more than that of the conventional organic ED device.

[0040] A method of manufacturing an organic EL device according to a fourth embodiment will be described as follows.

[0041] The method of the fourth embodiment has substantially the same steps as those of the first embodiment, except that the method of the fourth embodiment further comprises a step of thermally connecting a second electrode 15" of an inactive region outside a seal line with a seal-cup 14 made of SUS by means of an Al tape. After attaching a polarization film to the organic EL device formed by the method of the third embodiment as described above, the organic EL device was operated with white light of 200 cd/m^2 at 0.31 and 0.33 on the chromaticity diagram. As a result, compared with 52 °C of the conventional organic EL device, the organic EL device of the fourth embodiment was reduced in temperature to 42 °C, and it was presumed that the interior temperature of the device would be further reduced. In addition, it was confirmed that, as the device of the fourth embodiment was enhanced in stability by allowing heat to be effectively dissipated from the device, the organic EL device of the fourth embodiment had its lifetime increased 70 % or more than that of the conventional organic ED device.

[0042] Although the description is given for the active matrix bottom emission type organic EL device with the first electrode serving as a positive electrode and the second electrode serving as a negative electrode, the present invention can be applied to a Passive Matrix Bottom Emission type organic EL device. In other words, for the Passive Matrix Bottom Emission type organic EL device, the first electrode may be formed as a positive electrode, and the second electrode may be formed as a negative electrode such that the first electrode emits electrons, and the second electrode emits holes.

[0043] As apparent from the above description, the organic EL device according to the present invention can effectively dissipate heat generated upon driving of the organic EL device and heat from the TFT on the substrate thereof, lowering the interior temperature of the device compared with a conventional organic EL device, prevents degradation of the organic EL device, remarkably increasing lifetime thereof, and enhances interface stability of the device, remarkably suppressing degradation in characteristics of the device.

Claims

1. An organic EL device, comprising:

a substrate (10) having a first electrode (10") arranged on an active region;
at least one organic material layer (11) formed on the first electrode (10");
a second electrode (15) formed on the organic material layer (11) so as to extend to an inactive region of the substrate (10) to allow heat of the device to be dissipated to an outside therethrough;
a seal-cup (14) facing the second electrode (15) while being sealingly connected with the second electrode (15) at a seal line via a sealant (13);
wherein the inactive region is a region formed outside a sealing area defined by the seal line,
wherein the seal-cup (14) is made of SUS (Steel Use Stainless) being an opaque material, and the second electrode (15) on the seal line comprises a metal film (15"') having a plurality of stripes,
wherein an insulation material is coated on the second electrode (15) in the inactive region; and
a heat conductor (16) connecting an edge of the second electrode (15) on the inactive region with the seal-cup (14).

2. The organic EL device according to claim 1, wherein the substrate (10) is a transparent substrate and further comprises a TFT (10') arranged in matrix on the active region, and the second electrode (15) serves to inject electrons into the device and to reflect light.

3. An organic EL device, comprising:

a substrate (10) having a first electrode (10") arranged on an active region;
at least one organic material layer (11) formed on the first electrode (10");
a second electrode (15) formed on the organic material layer (11) and only formed on the active region inside a sealing area defined by a seal line;
a heat conductor (16) made of any one of a silver paste, a heat conductive tape and a thermal grease;
the heat conductor formed outside the sealing area and extending to a region inside the sealing

area, and directly connecting an edge of the second electrode (15) inside the sealing area with a seal-cup (14) to dissipate heat of the device to an outside thereof;
the seal-cup (14) facing the second electrode (15) while being connected with the heat conductor (16) at the seal line via a sealant (13) to seal the organic EL device.

4. The organic EL device according to claim 3, wherein the substrate (10) is a transparent substrate and further comprises a TFT (10') arranged in matrix on the active region, and the second electrode (15) serves to inject electrons into the device and to reflect light.

5. The organic EL device according to claim 1 or 3, wherein the second electrode (15) is composed of any one of MgAl alloys, pure Al, and alloys formed by adding at least one of Nd, Ta, Nb, Mo, W, Ti, Si, B and Ni in a ratio of 5 at.% to Al.

6. The organic EL device according to claim 1 or 3, wherein the second electrode (15) is composed of any one of pure Cu, pure Ag, and alloys formed by adding at least one of Au, Cu, Nd, Al, Sn, Mg, Ti, Pt, Pd and Ni in a ratio of 5 at.% to Cu or Al.

7. The organic EL device according to claim 1, wherein the second electrode (15) extends a length of 1 ~ 10 mm outwardly from the seal line.

8. The organic EL device according to claim 1, wherein the second electrode (15) is higher on the active region than on the inactive region.

9. The organic EL device according to claim 8, wherein stripes of the metallic film (15''') have a line width of 10 ~ 500 μm, and are separated by a distance of 10 ~ 500 μm from each other.

10. The organic EL device according to claim 2, wherein the second electrode (15) of the inactive region is formed in a direction of at least one side of the transparent substrate on the transparent substrate excluding a region where a TAB line is formed.

11. The organic EL device according to claim 10, wherein the second electrode (15) is formed on the four sides of the transparent substrate.

12. The organic EL device according to claim 1 or 3, wherein the second electrode (15) comprises at least two metallic layers.

13. The organic EL device according to claim 12, wherein the second electrode (15) has a double-layer structure formed by stacking an Al layer and a Cu layer.

14. A method for manufacturing an organic EL device, comprising the steps of:

forming a substrate (10) having a first electrode (10") formed thereon;
forming at least one organic material layer (11) on the first electrode (10") such that holes and electrons are injected to the organic material layer (11), and then combined therein to emit light therethrough;
forming a second electrode (10") on the organic material layer (11) to extend to an inactive region of the substrate, wherein the inactive region is a region formed outside a sealing area defined by a seal line; forming a seal-cup (14) to face the second electrode (15);
applying a sealant (13) to the second electrode (15) on the seal line and to an edge of the seal-cup (14), followed by curing the sealant (13) to seal the organic EL device,
wherein the seal-cup (14) is made of SUS (Steel Use Stainless) being an opaque material, and the second electrode (15) on the seal line comprises a metal film (15''') having a plurality of stripes,
wherein an insulation material is coated on the second electrode (15) in the inactive region; and forming a heat conductor (16) connecting an edge of the second electrode (15) outside the seal line with the seal-cup (14).

15. The method according to claim 14, wherein the substrate (10) is a transparent substrate and further comprises a TFT (10') arranged in matrix on the active region, and the second electrode (15) serves to inject the electrons into the device and to reflect light.

16. A method for manufacturing an organic EL device, comprising the steps of:

forming a substrate (10) having a first electrode (10") formed on an active region thereof;
forming at least one organic material layer (11) on the first electrode (10") such that holes and electrons are injected to the organic material layer (11), and then combined therein to emit light therethrough;
forming a second electrode (15) on the organic material layer (11) only on the active region inside a sealing area defined by a seal line; forming a seal-cup to face the second electrode (15), followed by forming a heat conductor (16) made of any one of a silver paste, a heat conductive tape and a thermal grease outside the sealing area and extending to a region inside the sealing area, and directly connecting an edge of the second electrode (15) inside a sealing area with the seal-cup (14) to dissipate heat of the device to

an outside thereof; and
connecting the heat conductor (16) at the seal line with the seal cup (14)using a sealant to seal the organic EL device.

17. The method according to claim 16, wherein the substrate (10) is a transparent substrate and further comprises a TFT (10') arranged in matrix on the active region, and the second electrode (15) serves to inject the electrons into the device and to reflect light.

18. The method according to claim 14, wherein the second electrode (15) is formed using a shadow mask having a size 1 ~ 10 mm or greater than that of the active region of the organic EL device.

19. The method according to claim 14, wherein the second electrode (15) is composed of any one of MgAg alloy, pure Al, pure Cu, pure Ag, alloy formed by adding at least one of Nd, Ta, Nb, Mo, W, Ti, Si, B and Ni in a ratio of 5 at. % to Al, and alloy formed by adding at least one of Au, Cu, Nd, Al, Sn, Mg, Ti, Pt, Pd and Ni in a ratio of 5 at. % to Cu or Al.

20. The method according to claim 15, wherein the second electrode (15) outside the seal line is formed in a direction of at least one side of the transparent substrate on the transparent substrate excluding a region where a TAB line is formed.

Patentansprüche

1. Organische EL-Vorrichtung, die Folgendes umfasst:

ein Substrat (10) mit einer ersten Elektrode (10"), die auf einer aktiven Region angeordnet ist;
mindestens eine organische Materialschicht (11), die auf der ersten Elektrode (10") ausgebildet ist;
eine zweite Elektrode (15), die auf der organischen Materialschicht (11) so ausgebildet ist, dass sie sich zu einer inaktiven Region des Substrats (10) erstreckt, um zu ermöglichen, dass Wärme der Vorrichtung nach außen abgeführt wird;
eine Dichtungsschale (14), die der zweiten Elektrode (15) zugewandt ist und gleichzeitig an einer Dichtungslinie mittels eines Dichtungsmittels (13) dichtend mit der zweiten Elektrode (15) verbunden ist;
wobei die inaktive Region eine Region ist, die außerhalb eines durch die Dichtungslinie definierten Dichtungsbereichs ausgebildet ist,
wobei die Dichtungsschale (14) aus SUS (Edelstahl) hergestellt ist, der ein undurchsichtiges Material ist, und die zweite Elektrode (15) auf der Dichtungslinie einen metallischen Film (15''') mit mehreren Streifen umfasst, wobei auf der zweiten Elektrode (15) in der inaktiven Region ein Isoliermaterial aufgetragen ist; und
einen Wärmeleiter (16), der einen Rand der zweiten Elektrode (15) auf der inaktiven Region mit der Dichtungsschale (14) verbindet.

2. Organische EL-Vorrichtung nach Anspruch 1, wobei das Substrat (10) ein transparentes Substrat ist und ferner einen TFT (10') umfasst, der in einer Matrix auf der aktiven Region angeordnet ist, und die zweite Elektrode (15) dazu dient, Elektronen in die Vorrichtung zu injizieren und Licht zu reflektieren.

3. Organische EL-Vorrichtung, die umfasst:

ein Substrat (10) mit einer ersten Elektrode (10"), die auf einer aktiven Region angeordnet ist;
mindestens eine organische Materialschicht (11), die auf der ersten Elektrode (10") ausgebildet ist;
eine zweite Elektrode (15), die auf der organischen Materialschicht (11) ausgebildet ist und nur auf der aktiven Region innerhalb eines durch eine Dichtungslinie definierten Dichtungsbereichs ausgebildet ist;
einen Wärmeleiter (16), der aus einer Silberpaste, einem wärmeleitenden Band oder einem Wärmefett hergestellt ist,
wobei der Wärmeleiter außerhalb des Dichtungsbereichs ausgebildet ist und sich zu einer Region innerhalb des Dichtungsbereichs erstreckt und einen Rand der zweiten Elektrode (15) innerhalb des Dichtungsbereichs direkt mit einer Dichtungsschale (14), verbindet, um die Wärme der Vorrichtung nach außen abzuführen;
wobei die Dichtungsschale (14) der zweiten Elektrode (15) zugewandt ist und gleichzeitig an der Dichtungslinie mittels eines Dichtungsmittels (13) mit dem Wärmeleiter (16) verbunden ist, um die organische EL-Vorrichtung abzudichten.

4. Organische EL-Vorrichtung nach Anspruch 3, wobei das Substrat (10) ein transparentes Substrat ist und ferner einen TFT (10') umfasst, der in einer Matrix auf der aktiven Region angeordnet ist, und die zweite Elektrode (15) dazu dient, Elektronen in die Vorrichtung zu injizieren und Licht zu reflektieren.

5. Organische EL-Vorrichtung nach Anspruch 1 oder 3, wobei die zweite Elektrode (15) aus MgAl-Legierungen, reinem Al oder Legierungen, die durch Zugabe von Nd, Ta, Nb, Mo, W, Ti, Si, B und/oder Ni in einem Verhältnis von 5 Atom-% zu Al gebildet sind, besteht.

6. Organische EL-Vorrichtung nach Anspruch 1 oder 3, wobei die zweite Elektrode (15) aus reinem Cu, reinem Ag oder Legierungen, die durch Zugabe von Au, Cu, Nd, Al, Sn Mg, Ti, Pt, Pd und/oder Ni in einem Verhältnis von 5 Atom-% zu Cu oder Al gebildet sind, besteht.

7. Organische EL-Vorrichtung nach Anspruch 1, wobei sich die zweite Elektrode (15) über eine Länge von 1 bis 10 mm von der Dichtungslinie nach außen erstreckt.

8. Organische EL-Vorrichtung nach Anspruch 1, wobei die zweite Elektrode (15) auf der aktiven Region höher ist als auf der inaktiven Region.

9. Organische EL-Vorrichtung nach Anspruch 8, wobei Streifen des metallischen Films (15''') eine Linienbreite von 10 ~ 500 μm aufweisen und durch einen Abstand von 10 ~ 500 μm voneinander getrennt sind.

10. Organische EL-Vorrichtung nach Anspruch 2, wobei die zweite Elektrode (15) der inaktiven Region in einer Richtung mindestens einer Seite des transparenten Substrats auf dem transparenten Substrat mit Ausnahme einer Region, in der eine TAB-Leitung ausgebildet ist, ausgebildet ist.

11. Organische EL-Vorrichtung nach Anspruch 10, wobei die zweite Elektrode (15) auf den vier Seiten des transparenten Substrats ausgebildet ist.

12. Organische EL-Vorrichtung nach Anspruch 1 oder 3, wobei die zweite Elektrode (15) mindestens zwei metallische Schichten umfasst.

13. Organische EL-Vorrichtung nach Anspruch 12, wobei die zweite Elektrode (15) eine Doppelschichtstruktur aufweist, die durch Stapeln einer Al-Schicht und einer Cu-Schicht ausgebildet ist.

14. Verfahren zum Herstellen einer organischen EL-Vorrichtung, das die folgenden Schritte umfasst:

Bilden eines Substrats (10) mit einer darauf ausgebildeten ersten Elektrode (10");
Bilden von mindestens einer organischen Materialschicht (11) auf der ersten Elektrode (10"), so dass Löcher und Elektronen in die organische Materialschicht (11) injiziert werden und dann darin kombiniert werden, um dadurch Licht zu emittieren;
Bilden einer zweiten Elektrode (10") auf der organischen Materialschicht (11) so, dass sie sich zu einer inaktiven Region des Substrats erstreckt, wobei die inaktive Region eine Region ist, die außerhalb eines durch eine Dichtungslinie definierten Dichtungsbereichs ausgebildet ist;
Bilden einer Dichtungsschale (14), die der zweiten Elektrode (15) zugewandt ist;
Aufbringen eines Dichtungsmittels (13) auf die zweite Elektrode (15) auf der Dichtungslinie und auf einen Rand der Dichtungsschale (14), anschließend Aushärten des Dichtungsmittels (13), um die organische EL-Vorrichtung abzudichten,
wobei die Dichtungsschale (14) aus SUS (Edelstahl) besteht, der ein lichtundurchlässiges Material ist, und die zweite Elektrode (15) auf der Dichtungslinie einen metallischen Film (15''') mit mehreren Streifen umfasst,
wobei ein Isoliermaterial in der inaktiven Region auf die zweite Elektrode (15) aufgebracht wird; und
Bilden eines Wärmeleiters (16), der einen Rand der zweiten Elektrode (15) außerhalb der Dichtungslinie mit der Dichtungsschale (14) verbindet.

15. Verfahren nach Anspruch 14, wobei das Substrat (10) ein transparentes Substrat ist und ferner einen TFT (10') umfasst, der in einer Matrix auf der aktiven Region angeordnet ist, und die zweite Elektrode (15) dazu dient, Elektronen in die Vorrichtung zu injizieren und Licht zu reflektieren.

16. Verfahren zum Herstellen einer organischen EL-Vorrichtung, das die folgenden Schritte umfasst:

Bilden eines Substrats (10) mit einer darauf ausgebildeten ersten Elektrode (10");
Bilden von mindestens einer organischen Materialschicht (11) auf der ersten Elektrode (10"), so dass Löcher und Elektronen in die organische Materialschicht (11) injiziert werden und dann darin kombiniert werden, um dadurch Licht zu emittieren;
Bilden einer zweiten Elektrode (15) auf der organischen Materialschicht (11) nur auf der aktiven Region innerhalb eines Dichtungsbereichs, der durch eine Dichtungslinie definiert ist;
Bilden einer Dichtungsschale so, dass sie der zweiten Elektrode (15) zugewandt ist,
anschließend Ausbilden eines Wärmeleiters (16) außerhalb des Dichtungsbereichs, der aus einer Silberpaste, einem wärmeleitenden Band oder einer Wärmeleitpaste hergestellt ist, sich zu einer Region innerhalb des Dichtungsbereichs erstreckt und einen Rand der zweiten Elektrode (15) innerhalb eines Dichtungsbereichs direkt mit der Dichtungsschale (14) verbindet, um Wärme der Vorrichtung nach außen abzuführen; und

Verbinden des Wärmeleiters (16) an der Dichtungslinie mit der Dichtungsschale (14) unter Verwendung eines Dichtungsmittels, um die organische EL-Vorrichtung abzudichten.

17. Verfahren nach Anspruch 16, wobei das Substrat (10) ein transparentes Substrat ist und ferner einen TFT (10') umfasst, der in einer Matrix auf der aktiven Region angeordnet ist, und die zweite Elektrode (15) dazu dient, Elektronen in die Vorrichtung zu injizieren und Licht zu reflektieren.

18. Verfahren nach Anspruch 14, wobei die zweite Elektrode (15) unter Verwendung einer Schattenmaske, die eine Größe von 1 bis 10 mm oder eine größere Größe als die aktive Region der organischen EL-Vorrichtung aufweist, ausgebildet wird.

19. Verfahren nach Anspruch 14, wobei die zweite Elektrode (15) aus einer MgAl-Legierung, reinem Al, reinem Cu, einer Legierung, die durch Zugabe von Nd, Ta, Nb, Mo, W, Ti, Si, B und/oder Ni in einem Verhältnis von 5 Atom-% zu Al gebildet ist, oder aus einer Legierung, die durch Zugabe von Au, Cu, Nd, Al, Sn Mg, Ti, Pt, Pd und/oder Ni in einem Verhältnis von 5 Atom-% zu Cu oder Al gebildet ist, besteht.

20. Verfahren nach Anspruch 15, wobei die zweite Elektrode (15) außerhalb der Dichtungslinie in einer Richtung mindestens einer Seite des transparenten Substrats auf dem transparenten Substrat mit Ausnahme einer Region, in der eine TAB-Leitung ausgebildet ist, ausgebildet wird.

Revendications

1. Dispositif électroluminescent organique, comprenant :

un substrat (10) comportant une première électrode (10") agencée sur une région active ;
au moins une couche de matériau organique (11) formée sur la première électrode (10") ;
une deuxième électrode (15) formée sur la couche de matériau organique (11) de manière à s'étendre dans une région inactive du substrat (10) pour permettre à une chaleur du dispositif de se dissiper à l'extérieur à travers celle-ci ;
une coupelle d'étanchéité (14) faisant face à la deuxième électrode (15) tout en étant raccordée de manière étanche à la deuxième électrode (15) à une ligne d'étanchéité par l'intermédiaire d'un scellant (13) ;
dans lequel la région inactive est une région formée à l'extérieur d'une zone d'étanchéité définie par la ligne d'étanchéité,
dans lequel la coupelle d'étanchéité (14) est constituée d'acier inoxydable, SUS, qui est un matériau opaque et la deuxième électrode (15) sur la ligne d'étanchéité comprend un fil métallique (15"') comportant une pluralité de bandes, dans lequel un matériau d'isolation est enduit sur la deuxième électrode (15) dans la région inactive ; et un conducteur de chaleur (16) raccordant un bord de la deuxième électrode (15) sur la région inactive à la coupelle d'étanchéité (14).

2. Dispositif électroluminescent organique selon la revendication 1, dans lequel le substrat (10) est un substrat transparent et comprend en outre un TFT (10') agencé dans une matrice sur la région active, et la deuxième électrode (15) sert à injecter des électrons dans le dispositif et à réfléchir une lumière.

3. Dispositif électroluminescent organique, comprenant :

un substrat (10) comportant une première électrode (10") agencée sur une région active ;
au moins une couche de matériau organique (11) formée sur la première électrode (10") ;
une deuxième électrode (15) formée sur la couche de matériau organique (11) et uniquement formée sur la région active à l'intérieur d'une zone d'étanchéité définie par une ligne d'étanchéité ;
un conducteur de chaleur (16) constitué de l'une quelconque d'une pâte d'argent, d'une bande thermoconductrice et d'une graisse thermique ;
le conducteur de chaleur étant formé à l'extérieur de la zone d'étanchéité et s'étendant dans une région à l'intérieur de la zone d'étanchéité, et raccordant directement un bord de la deuxième électrode (15) à l'intérieur de la zone d'étanchéité avec une coupelle d'étanchéité (14) pour dissiper la chaleur du dispositif à l'extérieur de celui-ci ;
la coupelle étanchéité (14) faisant face à la deuxième électrode (15) tout en étant raccordée au conducteur de chaleur (16) à la ligne d'étanchéité par l'intermédiaire d'un scellant (13) pour sceller le dispositif électroluminescent organique.

4. Dispositif électroluminescent organique selon la revendication 3, dans lequel le substrat (10) est un substrat transparent et comprend en outre un TFT (10') agencé dans une matrice sur la région active, et la deuxième électrode (15) sert à injecter des électrons dans le dispositif et à réfléchir une lumière.

5. Dispositif électroluminescent organique selon la revendication 1 ou 3, dans lequel la deuxième électrode (15) est composée de l'un quelconque d'alliages

MgAl, d'Al pur, et d'alliages formés en ajoutant au moins l'un de Nd, Ta, Nb, Mo, W, Ti, Si, B et Ni à un rapport de 5 % d'atomes sur Al.

6. Dispositif électroluminescent organique selon la revendication 1 ou 3, dans lequel la deuxième électrode (15) est composée de l'un quelconque de Cu pur, d'Ag pur, et d'alliages formés en ajoutant au moins l'un de Au, Cu, Nd, Al, Sn, Mg, Ti, Pt, Pd et Ni à un rapport de 5 % d'atomes sur Cu ou Al.

7. Dispositif électroluminescent organique selon la revendication 1, dans lequel la deuxième électrode (15) s'étend d'une longueur de 1 à 10 mm vers l'extérieur à partir de la ligne d'étanchéité.

8. Dispositif électroluminescent organique selon la revendication 1, dans lequel la deuxième électrode (15) est plus haute sur la région active que sur la région inactive.

9. Dispositif électroluminescent organique selon la revendication 8, dans lequel des bandes du film métallique (15"') ont une largeur de ligne de 10 à 500 μm, et sont séparées d'une distance de 10 à 500 μm l'une de l'autre.

10. Dispositif électroluminescent organique selon la revendication 2, dans lequel la deuxième électrode (15) de la région inactive est formée dans un sens d'au moins un côté du substrat transparent sur le substrat transparent à l'exclusion d'une région dans laquelle une ligne TAB est formée.

11. Dispositif électroluminescent organique selon la revendication 10, dans lequel la deuxième électrode (15) est formée sur les quatre côtés du substrat transparent.

12. Dispositif électroluminescent organique selon la revendication 1 ou 3, dans lequel la deuxième électrode (15) comprend au moins deux couches métalliques.

13. Dispositif électroluminescent organique selon la revendication 12, dans lequel la deuxième électrode (15) comporte une structure à deux couches constituée par empilement d'une couche Al et d'une couche Cu.

14. Procédé de fabrication d'un dispositif électroluminescent organique, comprenant les étapes de :

la formation d'un substrat (10) comportant une première électrode (10") formée sur celui-ci ;
la formation d'au moins une couche de matériau organique (11) sur la première électrode (10") de sorte que des trous et des électrons soient injectés dans la couche de matériau organique (11), puis combinés à l'intérieur de celle-ci pour émettre une lumière à travers celle-ci ;
la formation d'une deuxième électrode (10") sur la couche de matériau organique (11) de manière à s'étendre dans une région inactive du substrat, dans lequel la région inactive est une région formée à l'extérieur d'une zone d'étanchéité définie par une ligne d'étanchéité ;
la formation d'une coupelle d'étanchéité (14) pour faire face à la deuxième électrode (15) ;
l'application d'un scellant (13) à la deuxième électrode (15) sur la ligne d'étanchéité et sur un bord de la coupelle d'étanchéité (14), puis le durcissement du scellant (13) pour sceller le dispositif électroluminescent organique,
dans lequel la coupelle d'étanchéité (14) est constituée d'acier inoxydable, SUS, qui est un matériau opaque et la deuxième électrode (15) sur la ligne d'étanchéité comprend un fil métallique (15"') comportant une pluralité de bandes, dans lequel un matériau d'isolation est enduit sur la deuxième électrode (15) dans la région inactive ; et
la formation d'un conducteur de chaleur (16) raccordant un bord de la deuxième électrode (15) à l'extérieur de la ligne d'étanchéité à la coupelle d'étanchéité (14).

15. Procédé selon la revendication 14, dans lequel le substrat (10) est un substrat transparent et comprend en outre un TFT (10') agencé dans une matrice sur la région active, et la deuxième électrode (15) sert à injecter des électrons dans le dispositif et à réfléchir une lumière.

16. Procédé de fabrication d'un dispositif électroluminescent organique, comprenant les étapes de :

la formation d'un substrat (10) comportant une première électrode (10") formée sur une région active de celui-ci ;
la formation d'au moins une couche de matériau organique (11) sur la première électrode (10") de sorte que des trous et des électrons soient injectés dans la couche de matériau organique (11), puis combinés à l'intérieur de celle-ci pour émettre une lumière à travers celle-ci ;
la formation d'une deuxième électrode (15) sur la couche de matériau organique (11) uniquement sur la région active à l'intérieur d'une zone d'étanchéité définie par une ligne d'étanchéité ;
la formation d'une coupelle étanchéité pour faire face à la deuxième électrode (15), suivie de la formation d'un conducteur de chaleur (16) constitué de l'une quelconque d'une pâte d'argent, d'une bande thermoconductrice et d'une graisse thermique, à l'extérieur de la zone d'étanchéité

et s'étendant dans une région à l'intérieur de la zone d'étanchéité, et raccordant directement un bord de la deuxième électrode (15) à l'intérieur d'une zone d'étanchéité avec la coupelle d'étanchéité (14) pour dissiper la chaleur du dispositif à l'extérieur de celui-ci ; et le raccordement du conducteur de chaleur (16) à la ligne d'étanchéité à la coupelle d'étanchéité (14) en utilisant un scellant pour sceller le dispositif électroluminescent organique.

17. Procédé selon la revendication 16, dans lequel le substrat (10) est un substrat transparent et comprend en outre un TFT (10') agencé dans une matrice sur la région active, et la deuxième électrode (15) sert à injecter des électrons dans le dispositif et à réfléchir une lumière.

18. Procédé selon la revendication 14, dans lequel la deuxième électrode (15) est formée en utilisant un masque perforé ayant une taille de 1 à 10 mm ou supérieure à celle de la région active du dispositif électroluminescent organique.

19. Procédé selon la revendication 14, dans lequel la deuxième électrode (15) est composée de l'un quelconque d'alliage MgAl, d'Al pur, de Cu pur, d'Ag pur, d'alliage formé en ajoutant au moins l'un de Nd, Ta, Nb, Mo, W, Ti, Si, B et Ni à un rapport de 5 % d'atomes sur Al, et d'alliage formé en ajoutant au moins l'un de Au, Cu, Nd, Al, Sn, Mg, Ti, Pt, Pd et Ni à un rapport de 5 % d'atomes sur Cu ou Al.

20. Procédé selon la revendication 15, dans lequel la deuxième électrode (15) à l'extérieur de la ligne d'étanchéité est formée dans un sens d'au moins un côté du substrat transparent sur le substrat transparent à l'exclusion d'une région dans laquelle une ligne TAB est formée.

FIG. 1A

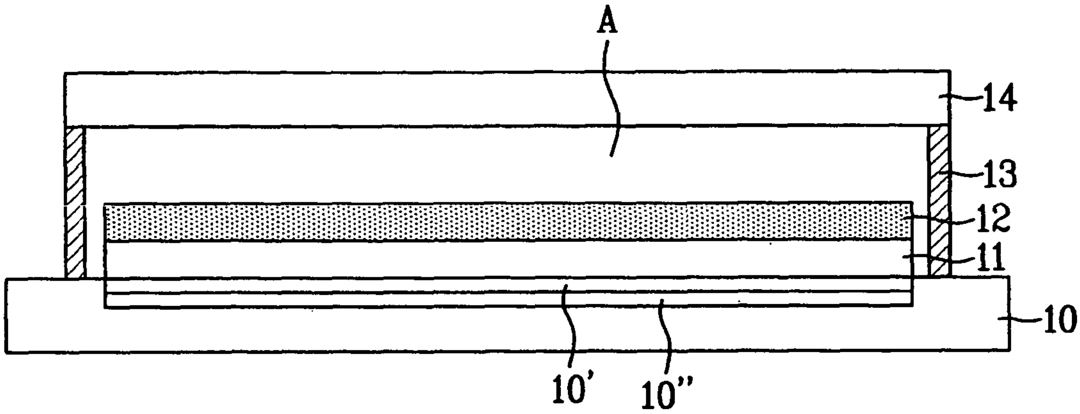


FIG. 1B

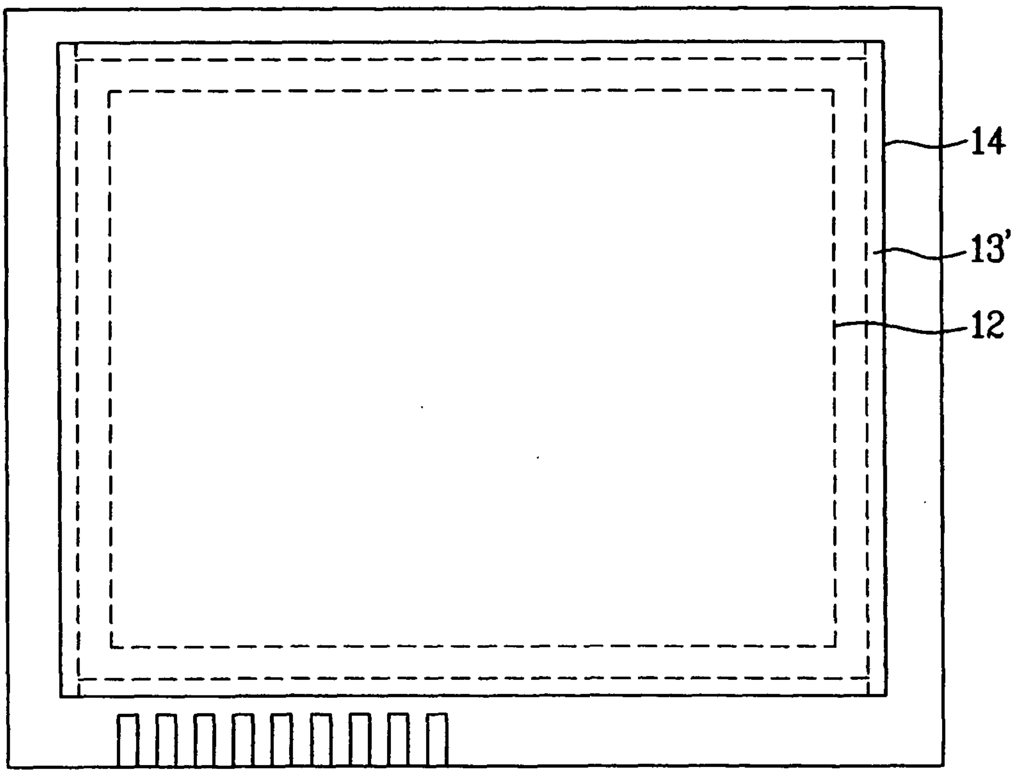


FIG. 2A

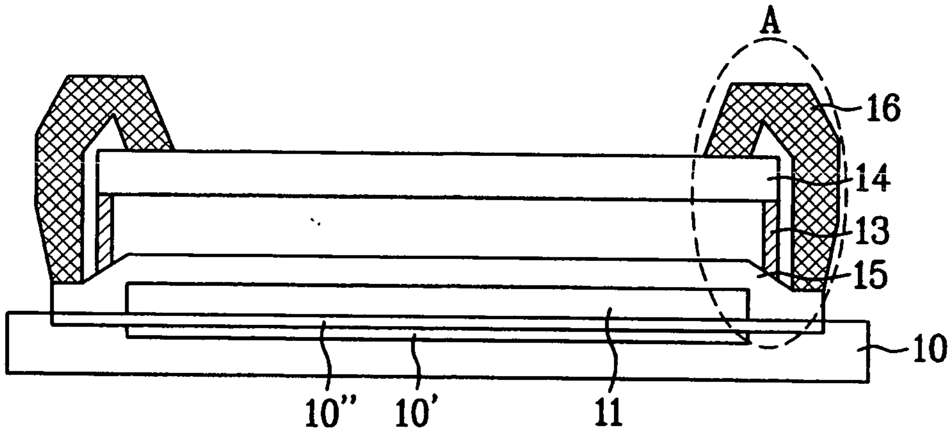


FIG. 2B

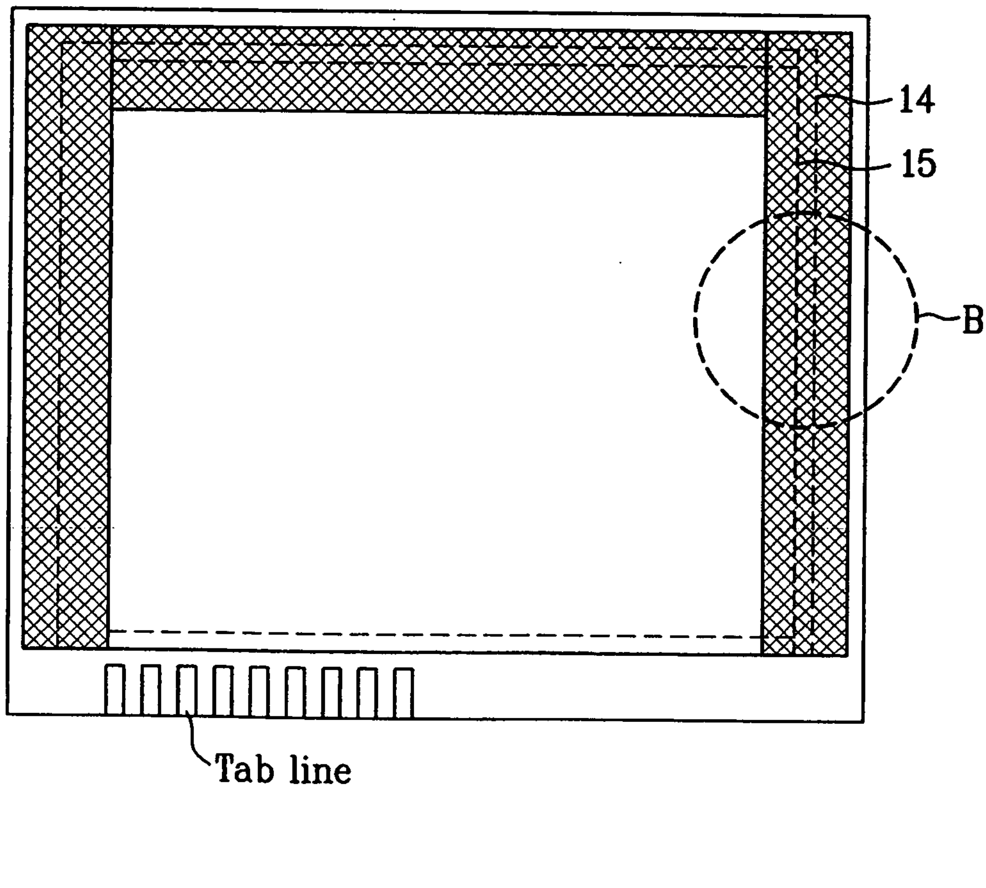


FIG. 2C

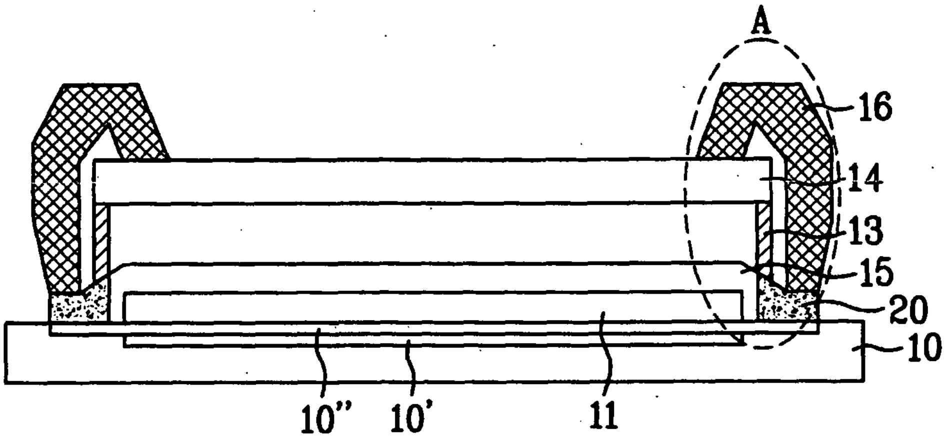


FIG. 2D

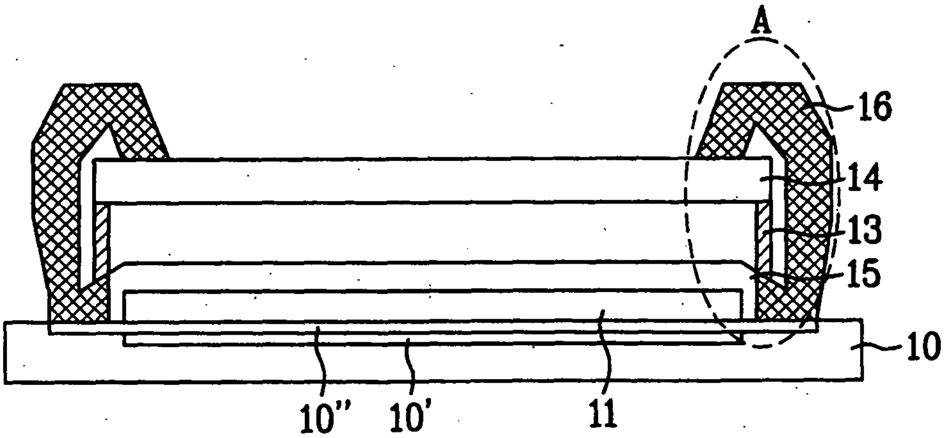


FIG. 3

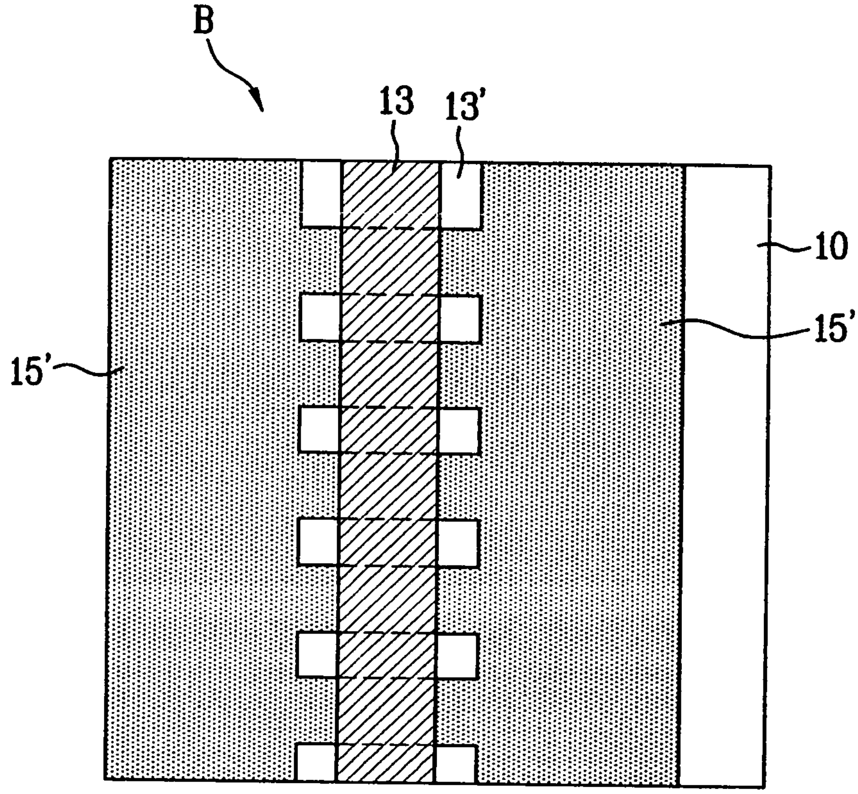


FIG. 4

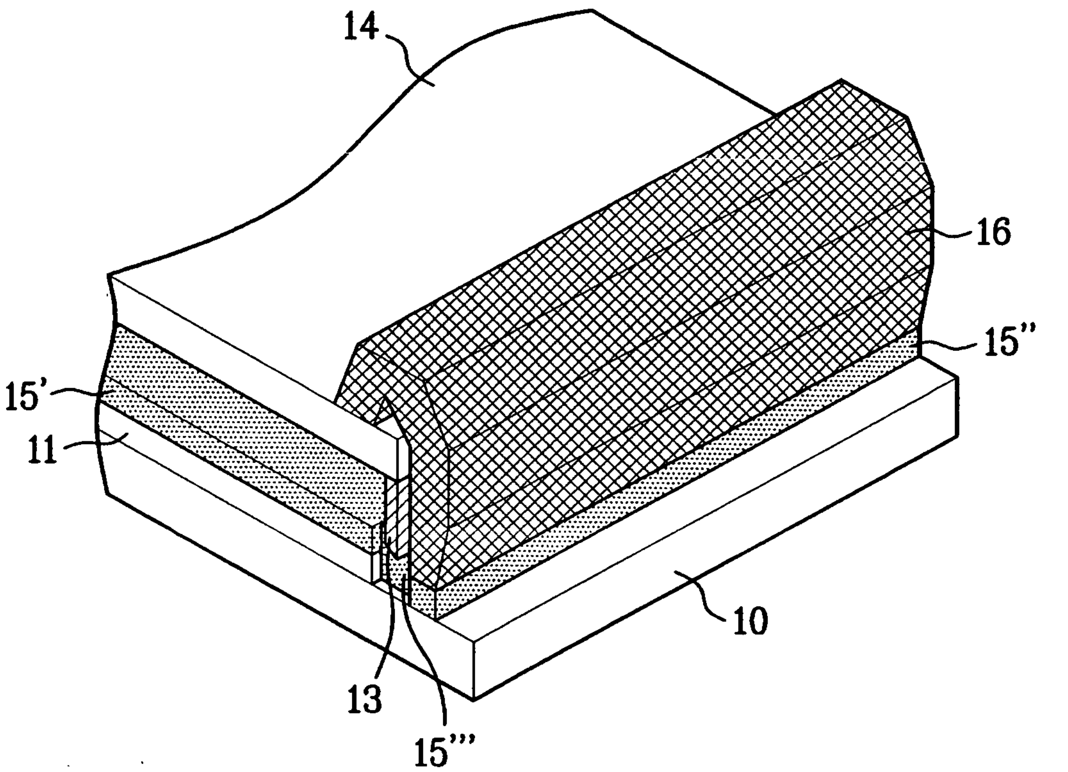


FIG. 5A

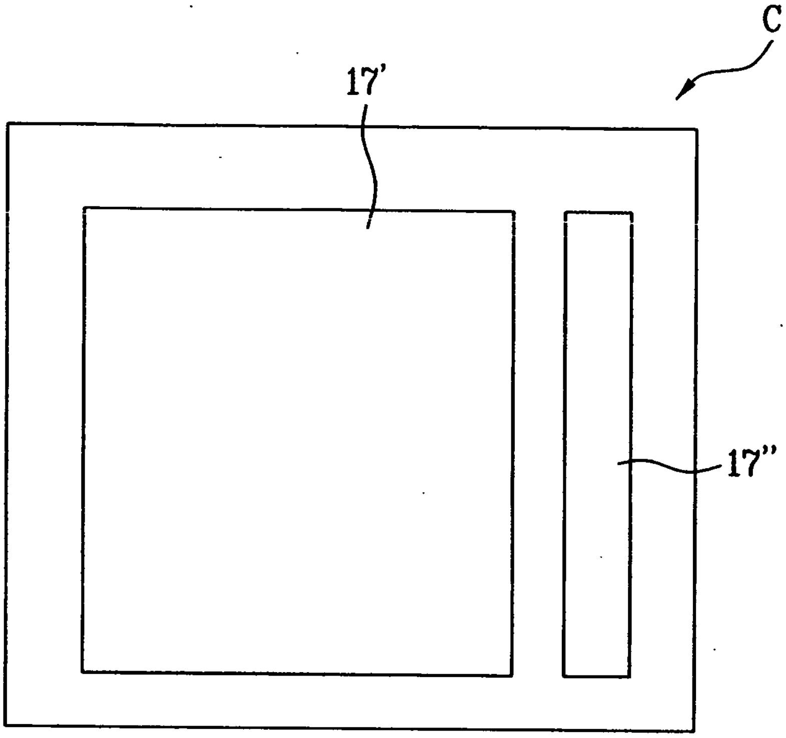


FIG. 5B

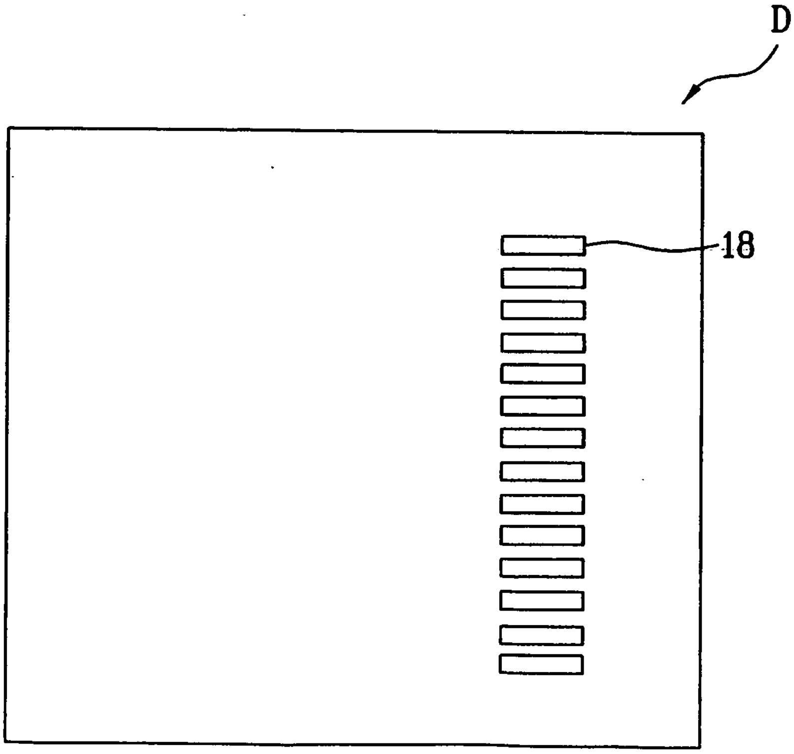
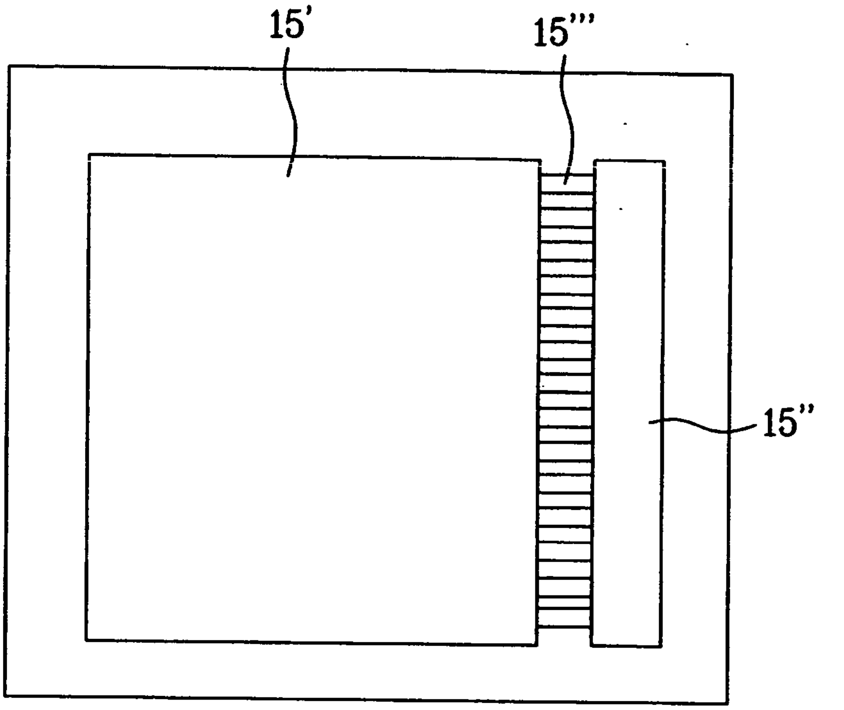


FIG. 6



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2003272856 A **[0008]**
- JP 2003100447 A **[0008]**
- JP 2004186045 A **[0008]**
- EP 0971564 A2 **[0008]**

专利名称(译)	有机电致发光显示器及其制造方法		
公开(公告)号	[EP1693908B1](#)	公开(公告)日	2018-02-21
申请号	EP2006003607	申请日	2006-02-22
申请(专利权)人(译)	LG电子株式会社.		
当前申请(专利权)人(译)	LG DISPLAY CO. , LTD.		
[标]发明人	KIM CHANG NAM HAN YOUNG SOO LEE HO NYUN CHUNG JIN WON KIM HONG GYU		
发明人	KIM, CHANG NAM HAN, YOUNG SOO LEE, HO NYUN CHUNG, JIN WON KIM, HONG GYU		
IPC分类号	H01L51/52 H01L27/32		
CPC分类号	H01L27/3244 H01L51/5221 H01L51/5243 H01L51/529		
优先权	1020050014475 2005-02-22 KR		
其他公开文献	EP1693908A2 EP1693908A3		
外部链接	Espacenet		

摘要(译)

公开了一种有机EL器件及其制造方法。有机EL器件包括衬底（10），其具有布置在有源区（10'）上的第一电极（10“），在第一电极上形成的至少一个有机材料层（11），第二电极（15）形成在有机材料层上以便延伸到基板的无源区域以允许器件的热量通过其散发到外部，并且密封杯（14）面对第二电极同时与第二电极密封连接通过密封剂（13）在密封线处的电极。有机EL器件可以有效地降低器件的内部温度，同时防止其劣化，从而显着增加器件的寿命，并提高器件的界面稳定性，从而显着地抑制器件特性的劣化。

FIG. 1A

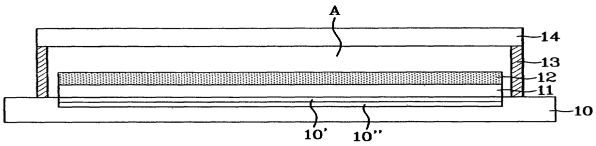


FIG. 1B