US 20130189895A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2013/0189895 A1

(43) Pub. Date: Jul. 25, 2013

HAN et al.

(54) **METHOD OF MANUFACTURING ORGANIC-LIGHT-EMITTING-DIODE FLAT-PANEL LIGHT-SOURCE APPARATUS**

(71) Applicant: **Electronics and Telecommunications Research Institute**, Daejeon (KR)

(72) Inventors: **Jun Han HAN**, Daejeon (KR); **Hye Yong CHU**, Daejeon (KR); **Jeong Ik LEE**, Gyeonggi-do (KR); **Doo Hee CHO**, Daejeon (KR); **Jong Hee LEE**, Daejeon (KR); **Joo Won LEE**, Seoul (KR); **Jin Wook SHIN**, Incheon (KR)

(73) Assignee: **Electronics and Telecommunications Research Institute**, Daejeon (KR)

(21) Appl. No.: **13/795,006**

(22) Filed: **Mar. 12, 2013**

Related U.S. Application Data

(62) Division of application No. 13/078,095, filed on Apr. 1, 2011, now Pat. No. 8,421,064.

(30) **Foreign Application Priority Data**

Apr. 9, 2010 (KR) 10-2010-0032773
Nov. 1, 2010 (KR) 10-2010-0107660

Publication Classification

(51) **Int. Cl.**
H05B 33/10 (2006.01)

(52) **U.S. Cl.**
CPC ***H05B 33/10*** (2013.01)
USPC **445/24**

(57) **ABSTRACT**

A method of manufacturing an organic-light-emitting-diode (OLED) flat-panel light-source apparatus. The method includes depositing a metal layer on a substrate and patterning the metal layer to form a plurality of subsidiary electrodes, forming an insulating layer on the substrate including the plurality of subsidiary electrodes and forming a first subsidiary electrode layer by etching the insulating layer until some of the plurality of subsidiary electrodes are exposed, and sequentially forming an anode, an organic emission layer (EML), and a cathode on the substrate on which the first subsidiary electrode layer is formed.

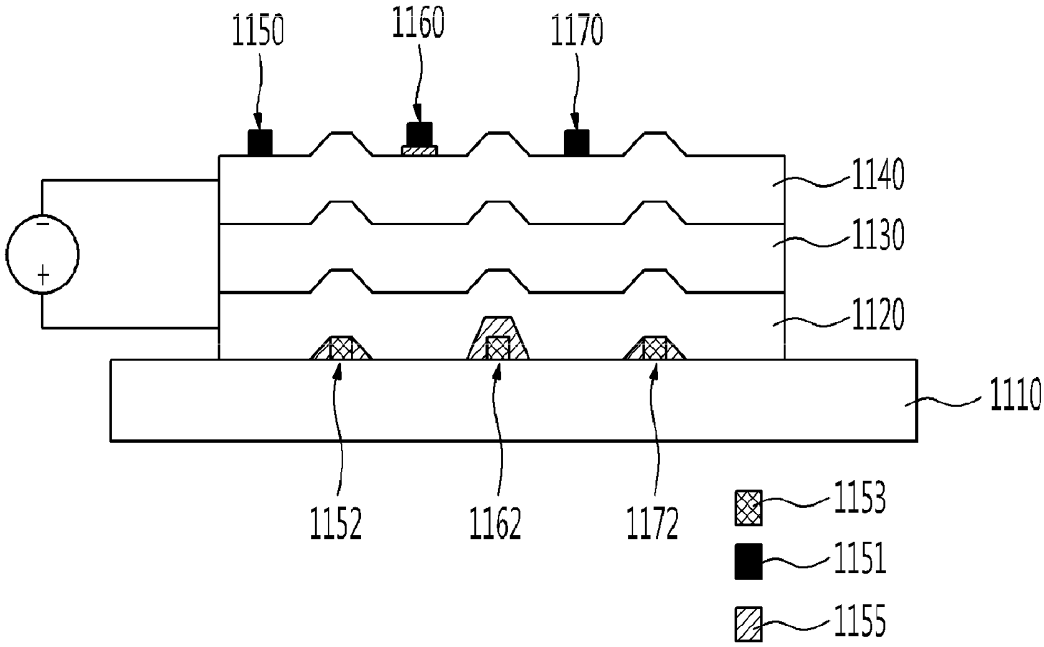


FIG. 1

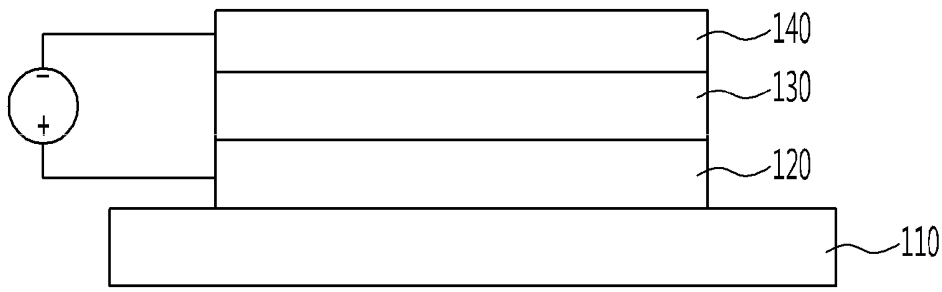

140
130
120
110
−
+

FIG. 2

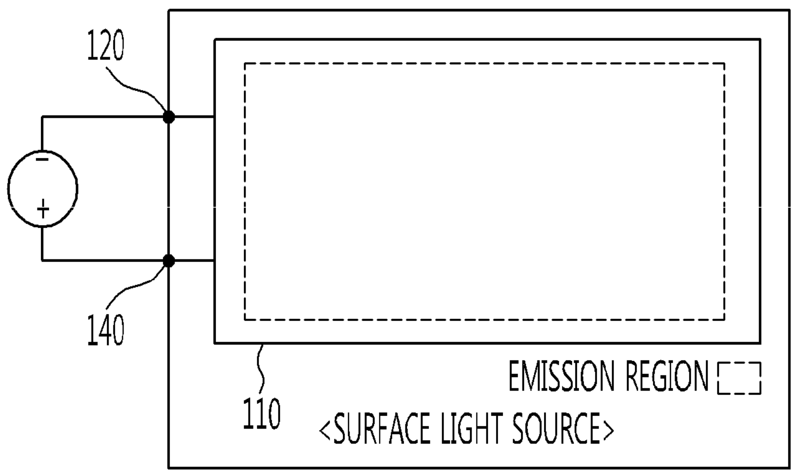
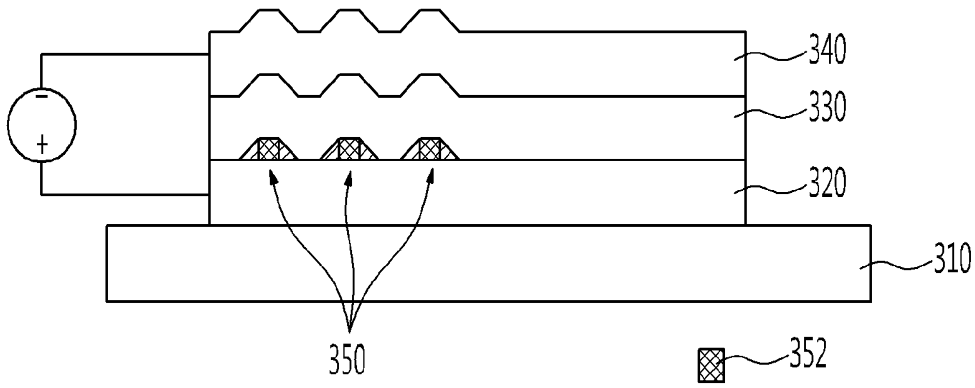
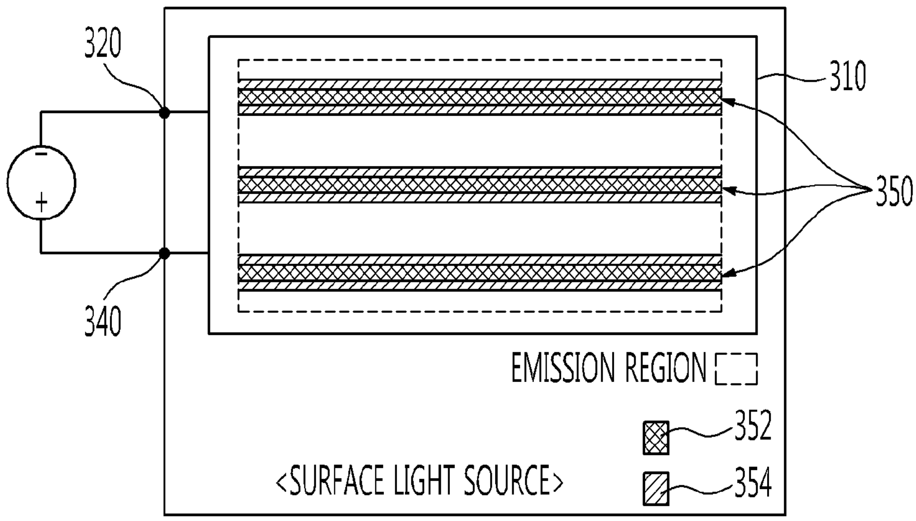

120
140
110
−
+
EMISSION REGION
<SURFACE LIGHT SOURCE>

FIG. 3



340
330
320
310
350
352
354

FIG. 4



320
340
310
350
EMISSION REGION
352
354
<SURFACE LIGHT SOURCE>

FIG. 5

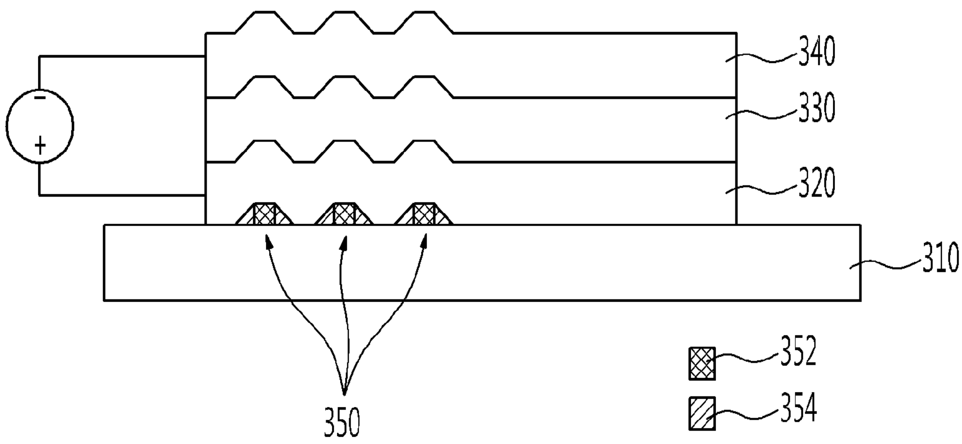

340
330
320
310
350
352
354

FIG. 6

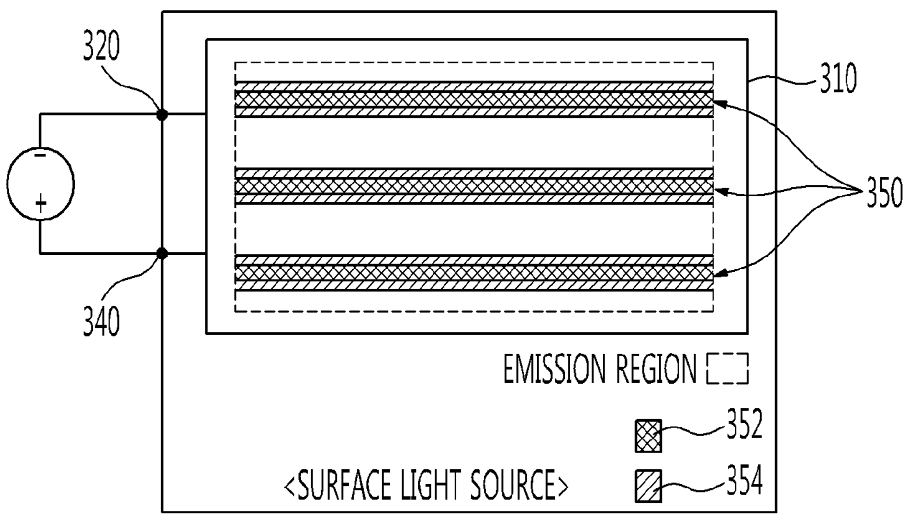

320
340
310
350
EMISSION REGION
352
<SURFACE LIGHT SOURCE>
354

FIG. 7A

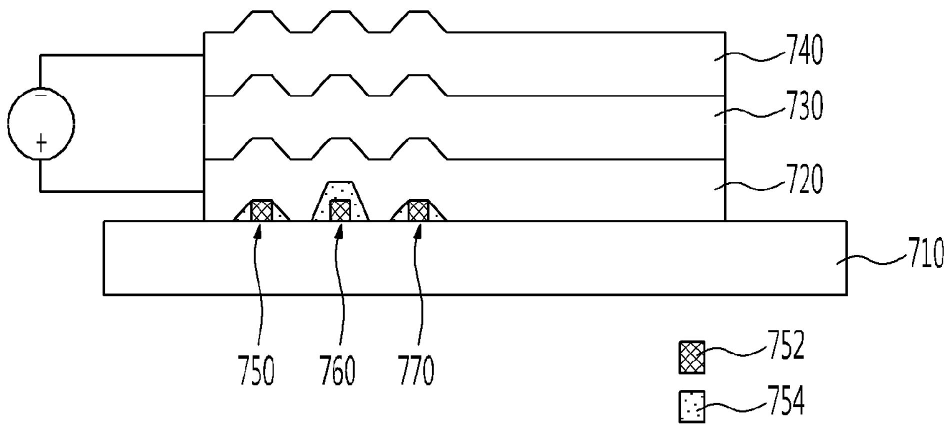

740
730
720
710
750
760
770
752
754

FIG. 7B

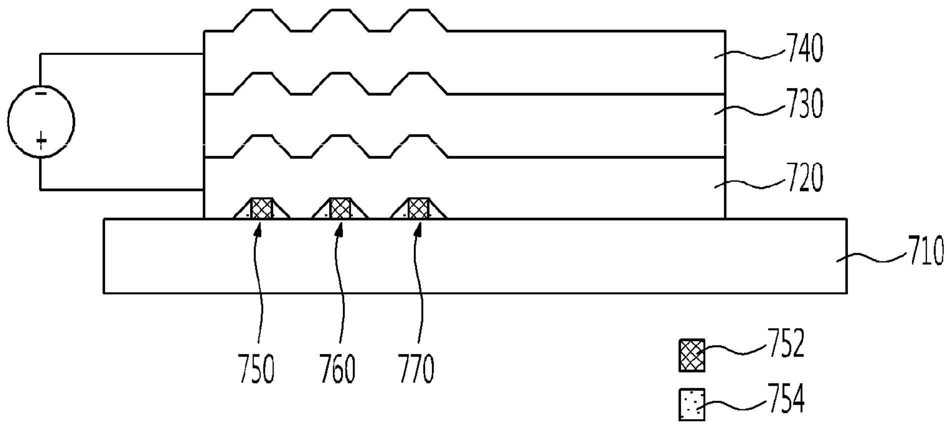

740
730
720
710
750
760
770
752
754

FIG. 8

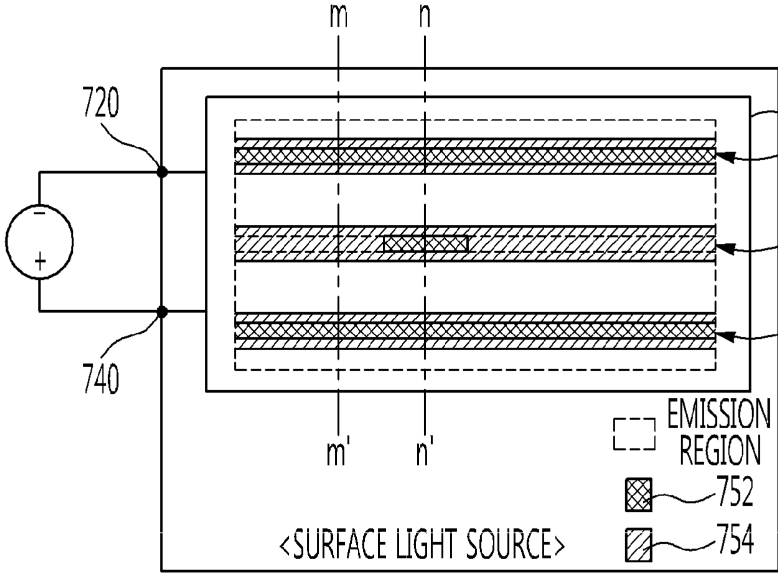

m
n
720
710
750
760
770
740
m'
n'
EMISSION
REGION
752
754
<SURFACE LIGHT SOURCE>

FIG. 9

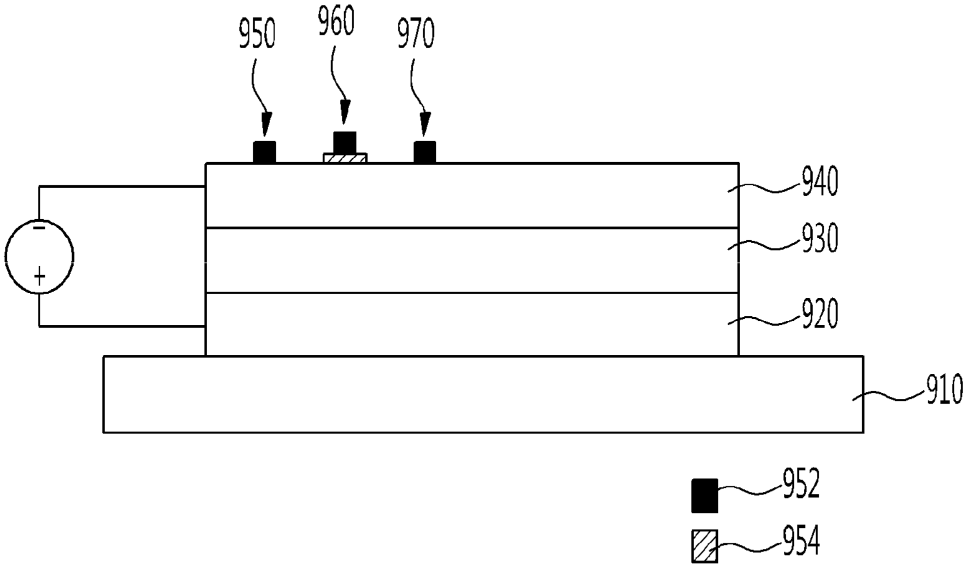

950
960
970
940
930
920
910
952
954

FIG. 10

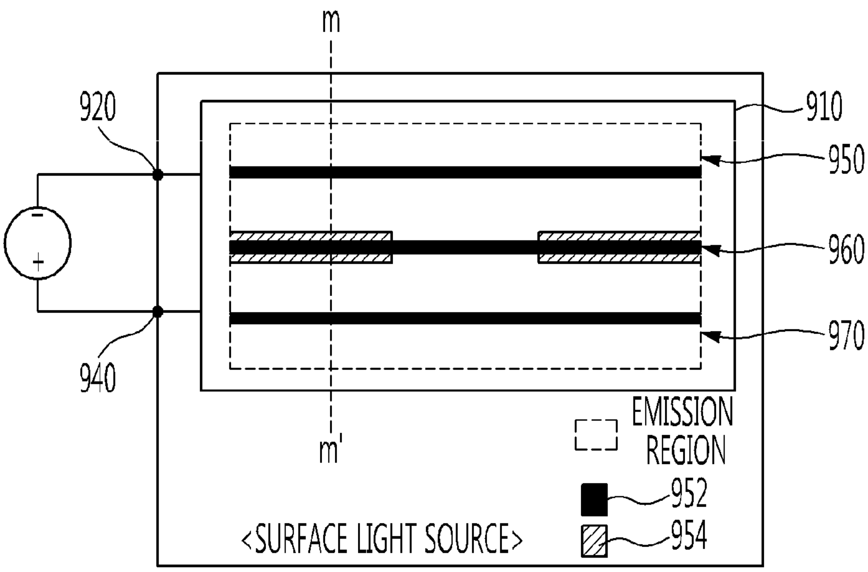

m
920
910
950
960
970
940
m'
EMISSION REGION
952
954
<SURFACE LIGHT SOURCE>

FIG. 11

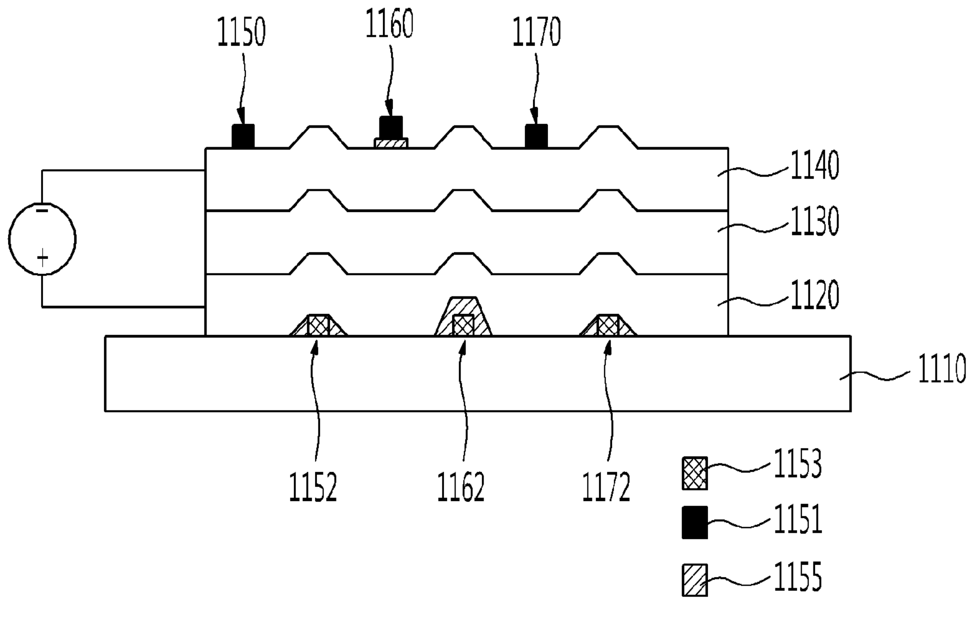

1150
1160
1170
1140
1130
1120
1110
1152
1162
1172
1153
1151
1155

FIG. 12

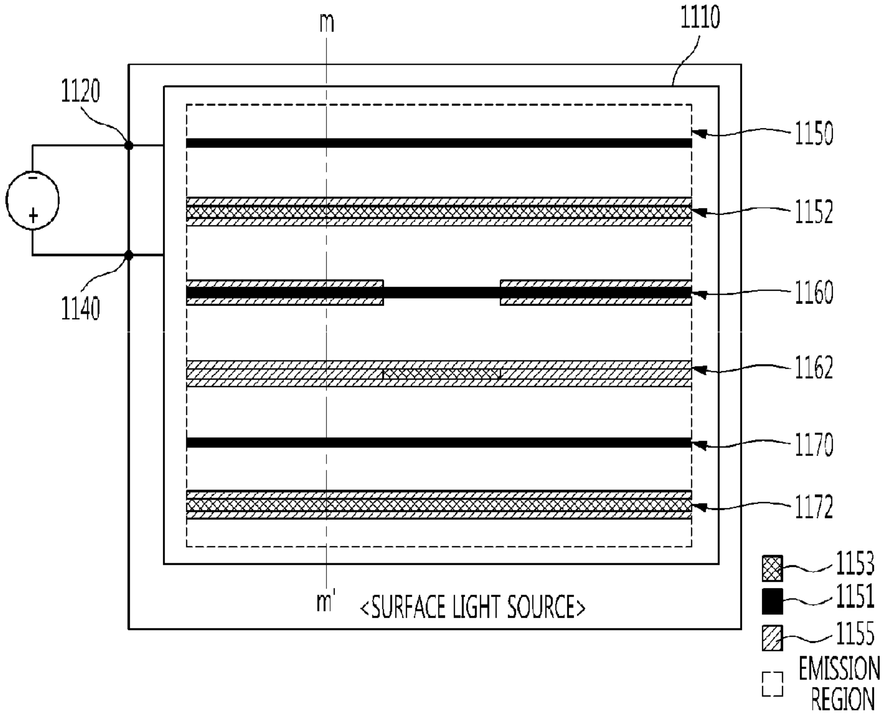

m
1110
1120
1150
1152
1140
1160
1162
1170
1172
m'
<SURFACE LIGHT SOURCE>
1153
1151
1155
EMISSION REGION

FIG. 13A

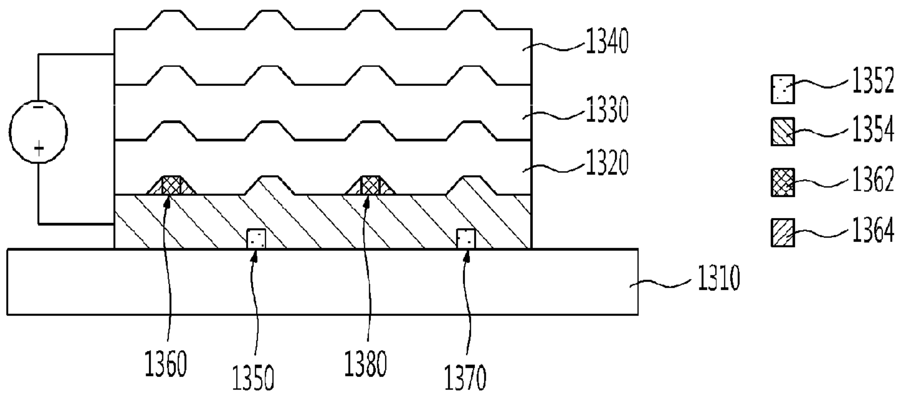


FIG. 13B

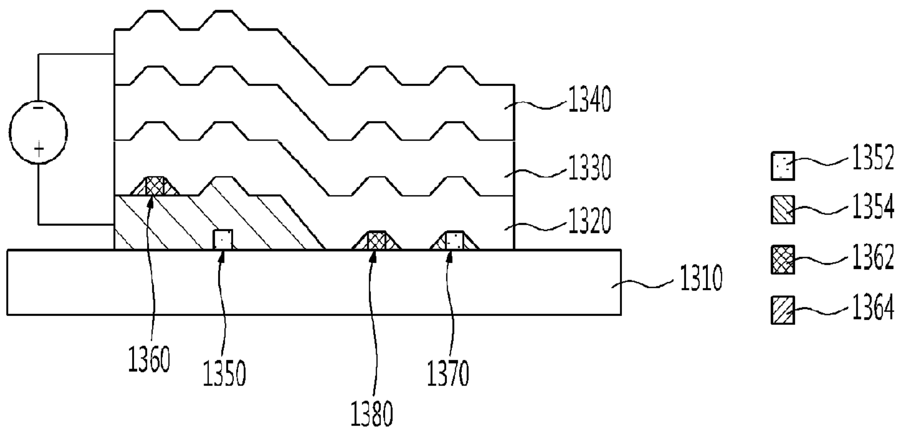


FIG. 14

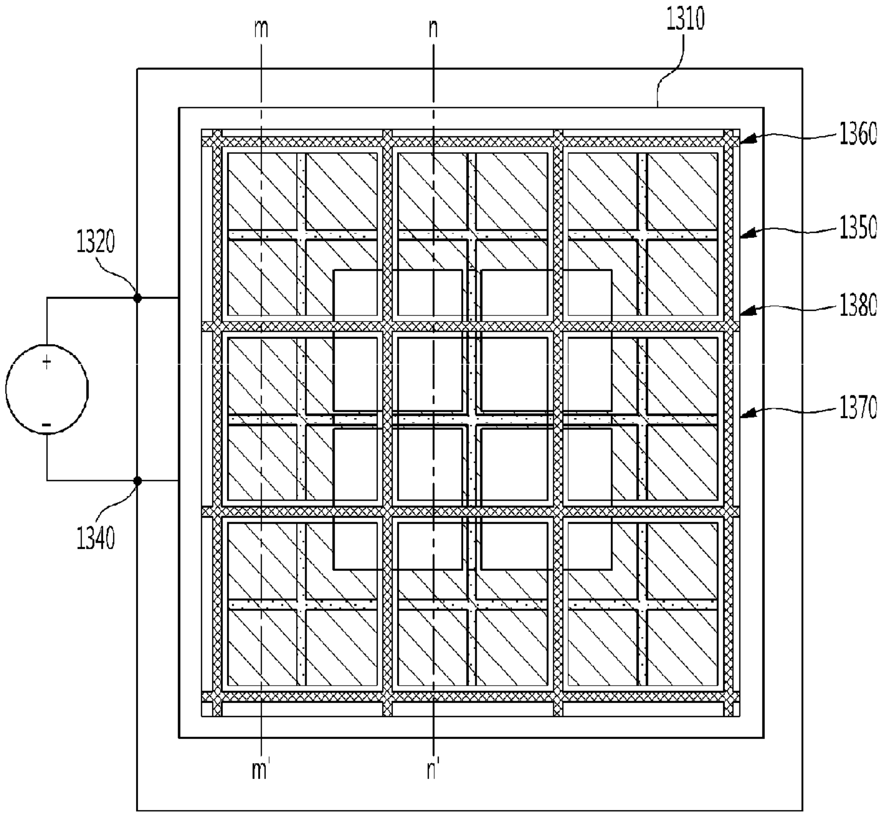


FIG. 15

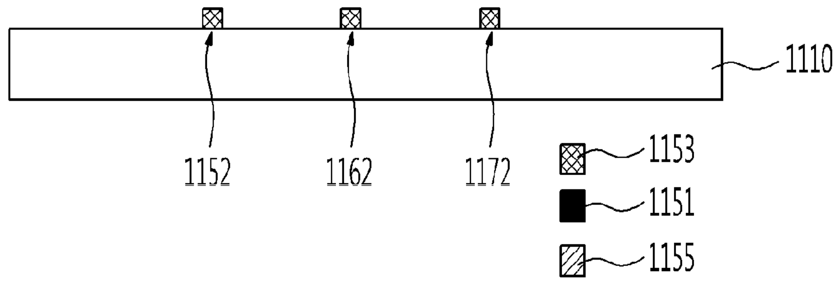


FIG. 16

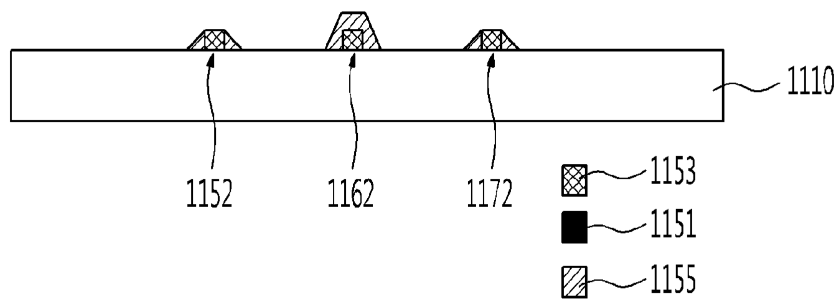


FIG. 17

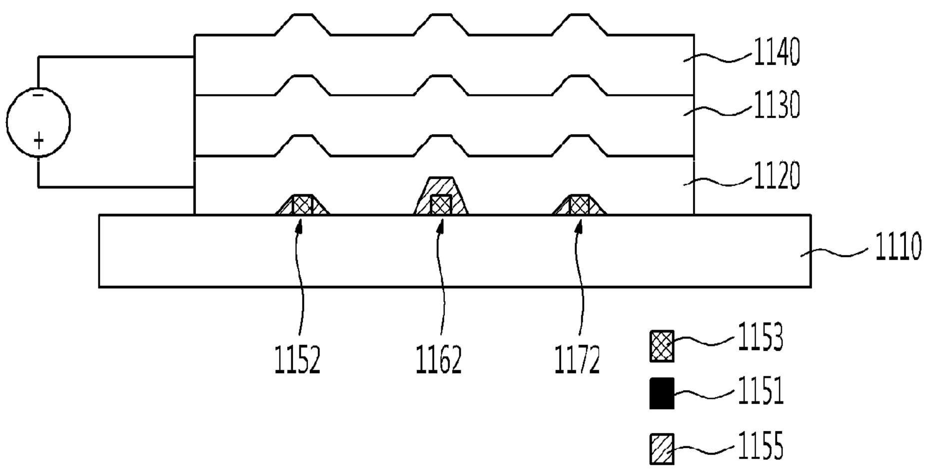


FIG. 18

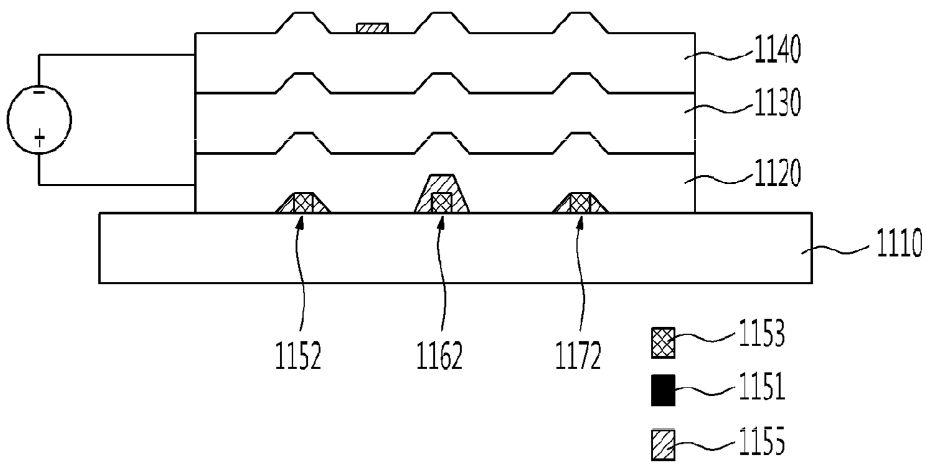
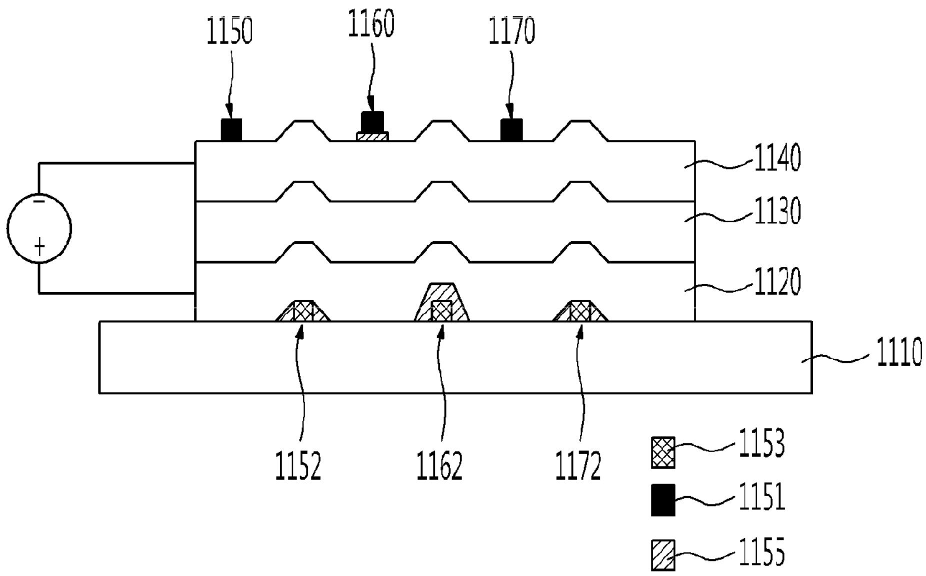

1140
1130
1120
1110
1152
1162
1172
1153
1151
1155

FIG. 19


1150
1160
1170
1140
1130
1120
1110
1152
1162
1172
1153
1151
1155

METHOD OF MANUFACTURING ORGANIC-LIGHT-EMITTING-DIODE FLAT-PANEL LIGHT-SOURCE APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a divisional of co-pending application Ser. No. 13/078,095 filed on Apr. 1, 2011, and claims priority to and the benefit of Korean Patent Application Nos. 10-2010-0032773 filed Apr. 9, 2010, and 10-2010-0107660 filed Nov. 1, 2010, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] 1. Field of the Invention

[0003] The present invention relates to an organic-light-emitting-diode (OLED) flat-panel light-source apparatus and, more particularly, to an OLED flat-panel light-source apparatus and a method of manufacturing the same, which may improve the uniformity of electrical and optical properties of a large-area OLED flat-panel light-source apparatus required for an illumination system and a display device.

[0004] 2. Discussion of Related Art

[0005] An organic light emitting diode (OLED) flat-panel light-source technique may be applied in various fields including an energy-saving eco-friendly illumination system, a flexible display device, a medical illumination system, and a backlight unit (BLU) of an LCD display device.

[0006] FIGS. **1** and **2** are a cross-sectional view and plan view, respectively, of a conventional OLED flat-panel light-source apparatus.

[0007] Referring to FIGS. **1** and **2**, the conventional OLED flat-panel light-source apparatus may include a substrate **110**, an anode **120**, an organic emission layer (EML) **130**, and a cathode **140**.

[0008] The organic EML **130** may be interposed between the anode **120** and the cathode **140**, each of which may be formed of a transparent metal layer or a reflective metal layer. When power is applied between the anode **120** and the cathode **140**, the organic EML **130** may emit light.

[0009] However, the conventional OLED flat-panel light-source apparatus should supply current to the organic EML **130** through the anode **120** and the cathode **140** so that the organic EML **130** can emit light. In this case, IR-drop may occur due to resistance components of the anode **120** and the cathode **140**. Thus, the conventional OLED flat-panel light-source apparatus may have non-uniform electrical and optical properties according to a position of an emission region due to the IR-drop. Also, in the conventional OLED flat-panel light-source apparatus, the emission region may be increased due to the scaling-up of OLED flat-panel light-surface apparatuses, thus increasing the non-uniformity of the electrical and optical properties.

[0010] In order to overcome the above-described drawbacks, an OLED flat-panel light-source apparatus using a subsidiary electrode layer has lately been proposed to reduce a sheet resistance component of an electrode and the non-uniformity of the electrical and optical properties due to the IR-drop.

[0011] FIGS. **3** through **6** are diagrams of an OLED flat-panel light-source apparatus including a subsidiary electrode layer. Specifically, FIGS. **3** and **4** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus in which a subsidiary electrode is formed between an anode and an organic material, and FIGS. **5** and **6** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus in which a subsidiary electrode is formed between an anode and a substrate.

[0012] Referring to FIGS. **3** through **6**, the OLED flat-panel light-source apparatus may include a substrate **310**, an anode **320**, an organic EML **330**, a cathode **340**, and a subsidiary electrode layer. Here, the subsidiary electrode layer may include a plurality of subsidiary electrodes **350** and an insulating layer **354** configured to compensate the coverage of the plurality of subsidiary electrodes **350**.

[0013] Each of the subsidiary electrodes **350** may include a metal layer **352** having a low sheet resistance. Thus, the plurality of subsidiary electrodes **350** may reduce a sheet-resistance component of the anode **320** or the cathode **340**, thereby reducing non-uniformity due to IR-drop.

[0014] However, it is difficult to embody a large-area OLED flat-panel light-source apparatus having uniform electrical and optical properties using a conventional method of manufacturing a large-area OLED flat-panel light-source apparatus.

SUMMARY OF THE INVENTION

[0015] The present invention is directed to an organic-light-emitting-diode (OLED) flat-panel light-source apparatus and a method of manufacturing the same, which may improve the electrical and optical properties of a large-area OLED flat-panel light-source apparatus.

[0016] One aspect of the present invention provides an OLED flat-panel light-source apparatus including: an anode and a cathode, to which externally applied power is applied, disposed on a substrate; an organic emission layer (EML) interposed between the anode and the cathode and configured to emit light due to power supplied through the anode and the cathode; and a subsidiary electrode layer including a plurality of subsidiary electrodes bonded to the anode or the cathode and configured to supply power to the anode or the cathode or electrically insulated from the anode or the cathode and configured to supply power to other emission regions.

[0017] Another aspect of the present invention provides a method of manufacturing an OLED flat-panel light-source apparatus. The method includes: depositing a metal layer on a substrate and patterning the metal layer to form a plurality of subsidiary electrodes; forming an insulating layer on the substrate including the plurality of subsidiary electrodes and forming a first subsidiary electrode layer by etching the insulating layer until some of the plurality of subsidiary electrodes are exposed; and sequentially forming an anode, an organic EML, and a cathode on the substrate on which the first subsidiary electrode layer is formed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The above and other features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

[0019] FIGS. **1** and **2** are a cross-sectional view and plan view, respectively, of a conventional organic-light-emitting-diode (OLED) flat-panel light-source apparatus;

[0020] FIGS. **3** and **4** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus in which a subsidiary electrode is formed between an anode and an organic material;

[0021] FIGS. **5** and **6** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus in which a subsidiary electrode is formed between an anode and a substrate;

[0022] FIGS. **7**A, **7**B, and **8** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a first exemplary embodiment of the present invention;

[0023] FIGS. **9** and **10** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a second exemplary embodiment of the present invention;

[0024] FIGS. **11** and **12** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a third exemplary embodiment of the present invention;

[0025] FIGS. **13**A, **13**B and **14** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a fourth exemplary embodiment of the present invention; and

[0026] FIGS. **15** through **19** are process flowcharts illustrating a method of manufacturing the OLED flat-panel light-source apparatus shown in FIGS. **11** and **12**.

DETAILED DESCRIPTION OF EMBODIMENTS

[0027] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments of the invention are shown. Descriptions of well-known components and processing techniques are omitted so as not to unnecessarily obscure the embodiments of the present invention.

[0028] FIGS. **7**A, **7**B, and **8** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a first exemplary embodiment of the present invention. Specifically, FIG. **7**A is a cross-sectional view taken along line m-m' of the OLED flat-panel light-source apparatus of FIG. **8**, and FIG. **7**B is a cross-sectional view taken along line n-n' of the OLED flat-panel light-source apparatus of FIG. **8**.

[0029] Referring to FIGS. **7**A, **7**B, and **8**, the OLED flat-panel light-source apparatus according to the present invention may include a substrate **710**, an anode **720**, an organic EML **730**, a cathode **740**, and a subsidiary electrode layer. Here, the subsidiary electrode layer may include first through third subsidiary electrodes **750**, **760**, and **770** and an insulating layer **754**. Here, the subsidiary electrode layer may include at least one subsidiary electrode.

[0030] The anode **720** and the cathode **740** may be sequentially formed on the substrate **710**, and externally applied power may be supplied to the organic EML **730**. Here, each of the anode **720** and the cathode **740** may include a transparent metal layer or a reflective metal layer.

[0031] The organic EML **730** may be interposed between the anode **720** and the cathode **740** and emit light due to power supplied through the anode **720** and the cathode **740**. Here, the organic EML **730** may be formed of an organic compound including an electron transport layer (ETL), an EML, and a hole transport layer (HTL).

[0032] The subsidiary electrode layer may include first and third subsidiary electrodes **750** and **770**, which may be bonded to the anode **720** and function to reduce a resistance component of the anode **720**, and a second subsidiary electrode **760**, which may supply power to other emission regions of the OLED flat-panel light-source apparatus. Here, each of the first through third subsidiary electrodes **750**, **760**, and **770** may include a metal layer **752** having a low sheet resistance, and the second subsidiary electrode **760** may be electrically insulated from the anode **720** by an insulating layer **754**. Hereinafter, construction and operation of each of the subsidiary electrodes **750**, **760**, and **770** will be described in detail.

[0033] Each of the first and third subsidiary electrodes **750** and **770** may be electrically connected in parallel to the anode **720** in the emission region and function to reduce the influence of IR-drop due to a driving current. That is, the first and third subsidiary electrodes **750** and **770** may supply additional power to the anode **720** and reduce the influence of IR-drop.

[0034] The second subsidiary electrode **760** may supply power to the other emission regions of the OLED flat-panel light-source apparatus. Specifically, as shown in FIG. **7**A, the second subsidiary electrode **760** may be electrically insulated from the anode **720** by the insulating layer **754** and serve as a coated electric wire for transmitting current in the emission region that may be less affected by the IR-drop. In contrast, as shown in FIG. **7**B, the second subsidiary electrode **760** may be bonded to the anode **720** and serve to supply power in the emission region that may be more affected by the IR-drop.

[0035] Accordingly, the OLED flat-panel light-source apparatus according to the present invention may not be affected by IR-drop but receive power using the second subsidiary electrode **760** even in the emission region disposed a far distance from a driver unit (not shown). Thus, the non-uniformity of electrical and optical properties of a large-area OLED flat-panel light-source apparatus due to the IR-drop of the anode **720** may be overcome without additional thin layers and manufacturing processes.

[0036] FIGS. **9** and **10** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a second exemplary embodiment of the present invention. Specifically, FIG. **9** is a cross-sectional view taken along line m-m' of the OLED flat-panel light-source apparatus of FIG. **10**.

[0037] Referring to FIGS. **9** and **10**, the OLED flat-panel light-source apparatus according to the second embodiment may include a subsidiary electrode layer disposed on a cathode **940** unlike the OLED flat-panel light-source apparatus according to the first embodiment.

[0038] The subsidiary electrode layer may include first and third subsidiary electrodes **950** and **970**, which may be bonded to the cathode **940**, and function to reduce a resistance component of the cathode **940**, and a second subsidiary electrode **960**, which may be separated from the cathode **940** and function to supply power to other emission regions of the flat-panel light-source apparatus. Here, each of the first through third subsidiary electrodes **950**, **960**, and **970** may include a metal layer **952** having a low sheet resistance, and the second subsidiary electrode **960** may be electrically insulated from the cathode **940** by an insulating layer **954**.

[0039] Each of the first and third subsidiary electrodes **950** and **970** may be electrically connected in parallel to the cathode **940** in an emission region and reduce the influence of IR-drop due to a driving current.

[0040] The second subsidiary electrode **960** may supply power to the other emission regions of the OLED flat-panel light-source apparatus. Specifically, the second subsidiary electrode **960** may be electrically insulated from the cathode

940 by the insulating layer **954** and serve as a coated electric wire for transmitting current in the emission region that may be less affected by the IR-drop. In contrast, the second subsidiary electrode **960** may be bonded to the cathode **940** and serve to supply power in the emission region that may be more affected by the IR-drop.

[0041] Accordingly, the non-uniformity of electrical and optical properties of a large-area OLED flat-panel light-source apparatus due to the IR-drop of the cathode **940** may be overcome.

[0042] FIGS. **11** and **12** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a third exemplary embodiment of the present invention. Specifically, FIG. **11** is a cross-sectional view taken along line m-m' of the OLED flat-panel light-source apparatus of FIG. **12**.

[0043] Referring to FIGS. **11** and **12**, the OLED flat-panel light-source apparatus according to the third embodiment may include a first subsidiary electrode layer interposed between a substrate **1110** and an anode **1120** and a second subsidiary electrode layer disposed on a cathode **1140**.

[0044] The first subsidiary electrode layer may include first and third subsidiary electrodes **1152** and **1172**, which may be bonded to the anode **1120** and reduce a resistance component of the anode **1120**, and a second subsidiary electrode **1162**, which may be separated from the anode **1120** and supply power to other emission regions of the OLED flat-panel light-source apparatus. Here, each of the subsidiary electrodes **1152**, **1162**, and **1172** may include a metal layer **1153** having a low sheet resistance, and the second subsidiary electrode **1162** may be electrically insulated from the anode **1120** by an insulating layer **1155**.

[0045] Each of the first and third subsidiary electrodes **1152** and **1172** may be electrically connected in parallel to the anode **1120** in an emission region and reduce the influence of IR-drop due to a driving current.

[0046] The second subsidiary electrode **1162** may supply power to the other emission regions of the OLED flat-panel light-source apparatus. The second subsidiary electrode **1162** may be electrically insulated from the anode **1120** and serve as a coated electric wire for transmitting current in an emission region that may be less affected by the IR-drop. In contrast, the second subsidiary electrode **1162** may be bonded to the anode **1120** and supply power in an emission region that may be more affected by the IR-drop.

[0047] The second subsidiary electrode layer may include fourth and sixth subsidiary electrodes **1150** and **1170**, which may be bonded to the cathode **1140** and reduce a resistance component of the cathode **1140**, and a fifth subsidiary electrode **1160**, which may be separated from the cathode **1140** and supply power to the other emission regions of the OLED flat-panel light-source apparatus. Here, each of the subsidiary electrodes **1150**, **1160**, and **1170** may include a metal layer **1151** having a low sheet resistance, and the fifth subsidiary electrode **1160** may be electrically insulated from the cathode **1140** by an insulating layer **1155**.

[0048] Each of the fourth and sixth subsidiary electrodes **1150** and **1170** may be electrically connected in parallel to the cathode **1140** in an emission region and reduce the influence of IR-drop due to a driving current.

[0049] The fifth subsidiary electrode **1160** may supply power to the other emission regions of the OLED flat-panel light-source apparatus. Specifically, the fifth subsidiary electrode **1160** may be electrically insulated from the cathode **1140** and serve as a coated electric wire for transmitting current in an emission region that may be less affected by the IR-drop. In contrast, the fifth subsidiary electrode **1160** may be bonded to the cathode **1140** and serve to supply power in an emission region that may be more affected by the IR-drop.

[0050] Accordingly, the non-uniformity of electrical and optical properties of a large-area OLED flat-panel light-source apparatus due to the IR-drop of an anode and a cathode may be overcome.

[0051] FIGS. **13**A, **13**B and **14** are a cross-sectional view and plan view, respectively, of an OLED flat-panel light-source apparatus according to a fourth exemplary embodiment of the present invention. Specifically, FIG. **13**A is a cross-sectional view taken along line m-m' of the OLED flat-panel light-source apparatus of FIG. **14**, and FIG. **13**B is a cross-sectional view taken along line n-n' of the OLED flat-panel light-source apparatus of FIG. **14**.

[0052] In the fourth embodiment, the above-described OLED flat-panel light-source apparatus including the subsidiary electrode layer may be structurally improved so that the OLED flat-panel light-source apparatus can include a plurality of subsidiary electrode layers. Also, from the plan view, the OLED flat-panel light-source apparatus according to the fourth embodiment may be configured to have a lattice structure, thereby reducing the influence of IR-drop. For brevity, an OLED flat-panel light-source apparatus including two subsidiary electrode layers will be described as an example.

[0053] Referring to FIGS. **13**A, **13**B, and **14**, the OLED flat-panel light-source apparatus according to the fourth embodiment may include a first subsidiary electrode layer including first and third subsidiary electrodes **1350** and **1370** and a first insulating layer **1354** and a second subsidiary electrode layer including second and fourth subsidiary electrodes **1360** and **1380** and a second insulating layer **1364**. Here, each of the first and third subsidiary electrodes **1350** and **1370** may include a first metal layer **1352**, and each of the second and fourth subsidiary electrodes **1360** and **1380** may include a second metal layer **1362**.

[0054] As shown in FIG. **13**A, the first and third subsidiary electrodes **1350** and **1370** of the first subsidiary electrode layer may be electrically insulated from the anode **1320** and serve as coated electric wires for supplying power to other emission regions of the flat-panel light-source apparatus in an emission region that may be less affected by the IR-drop. Also, as shown in FIG. **13**B, the third subsidiary electrode **1370** of the first subsidiary electrode layer may be bonded to the anode **1320** and serve to supply power to the anode **1320** in an emission region that may be more affected by the IR-drop. Furthermore, the second subsidiary electrode layer may be bonded to the anode **1320** and reduce a resistance component of the anode **1320**.

[0055] Hereinafter, a method of manufacturing the OLED flat-panel light-source apparatus according to the third embodiment of the present invention will be described. Here, since the methods of manufacturing the OLED flat-panel light-source apparatuses according to the first and second embodiments of the present invention include about the same processes as the method of manufacturing the OLED flat-panel light-source apparatus according to the third embodiment of the present invention, a detailed description thereof will be omitted.

[0056] FIGS. **15** through **19** are process flowcharts illustrating a method of manufacturing the OLED flat-panel light-source apparatus shown in FIGS. **11** and **12**.

[0057] Referring to FIG. **15**, a metal layer **1153** may be deposited on a substrate **1110** and patterned, thereby forming first through third subsidiary electrodes **1152**, **1162**, and **1172**. Here, the metal layer **1153** may be formed using a metal having a sheet resistance.

[0058] Referring to FIG. **16**, an insulating layer **1155** may be formed on the substrate **1110** including the first through third subsidiary electrodes **1152**, **1162**, and **1172** and etched to expose the second subsidiary electrode **1162** out of the first through third subsidiary electrodes **1152**, **1162**, and **1172**, thereby forming a first subsidiary electrode layer. The first subsidiary electrode layer may include a plurality of subsidiary electrode layers. Here, since a method of forming the plurality of subsidiary electrode layers is obvious to those skilled in the art, a description thereof will be omitted.

[0059] Referring to FIG. **17**, an anode **1120**, an organic EML **1130**, and a cathode **1140** may be sequentially formed on the substrate **1110** having the first subsidiary electrode layer.

[0060] Referring to FIG. **18**, an insulating layer **1155** may be formed on the cathode **1140** and etched. Here, the insulating layer **1155** may electrically insulate a subsequent sixth subsidiary electrode **1160** from the cathode **1140**.

[0061] Referring to FIG. **19**, a metal layer **1151** may be formed on the cathode **1140** on which the insulating layer **1155** is formed. The metal layer **1151** may be patterned, thereby forming a second subsidiary electrode layer including fifth through seventh subsidiary electrodes **1150**, **1160**, and **1170** on the insulating layer **1155** or the cathode **1140**.

[0062] According to the present invention as described above, an OLED flat-panel light-source apparatus and a method of manufacturing the same can improve the uniformity of electrical and optical properties of a large-area OLED flat-panel light-source apparatus.

[0063] Furthermore, the influence of IR-drop of an anode and a cathode can be overcome without classifying an OLED flat-panel light-source apparatus into pixels or segments so that a large-area OLED flat-panel light-source apparatus can be manufactured at low cost.

[0064] In the drawings and specification, there have been disclosed typical exemplary embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation. As for the scope of the invention, it is to be set forth in the following claims. Therefore, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

What is claimed is:

1. A method of manufacturing an organic-light-emitting-diode (OLED) flat-panel light-source apparatus, the method comprising:

depositing a metal layer on a substrate and patterning the metal layer to form a plurality of subsidiary electrodes;

forming an insulating layer on the substrate including the plurality of subsidiary electrodes and forming a first subsidiary electrode layer by etching the insulating layer until some of the plurality of subsidiary electrodes are exposed; and

sequentially forming an anode, an organic emission layer (EML), and a cathode on the substrate on which the first subsidiary electrode layer is formed.

2. The method of claim **1**, wherein some of the plurality of subsidiary electrodes are bonded to the anode and supply power to the anode in an emission region less affected by IR-drop, and others of the plurality of subsidiary electrodes are electrically insulated from the anode and supply power to other emission regions in an emission region more affected by the IR-drop.

3. The method of claim **1**, further comprising:

forming an insulating layer on the cathode and etching the insulating layer; and

depositing a metal layer on the cathode on which the insulating layer is formed and forming the plurality of subsidiary electrodes on the insulating layer or the cathode by patterning the metal layer to form a second subsidiary electrode layer.

4. The method of claim **1**, further comprising, after forming the first subsidiary electrode layer:

depositing a metal layer on the substrate on which the first subsidiary electrode layer is deposited and patterning the metal layer to form the plurality of subsidiary electrodes; and

forming an insulating layer on the first subsidiary electrode layer including the plurality of subsidiary electrodes and etching the insulating layer until some of the plurality of subsidiary electrodes are exposed to form a second subsidiary electrode layer.

* * * * *

专利名称(译)	制造有机发光二极管平板光源装置的方法		
公开(公告)号	US20130189895A1	公开(公告)日	2013-07-25
申请号	US13/795006	申请日	2013-03-12
当前申请(专利权)人(译)	电子通信研究院		
[标]发明人	HAN JUN HAN CHU HYE YONG LEE JEONG IK CHO DOO HEE LEE JONG HEE LEE JOO WON SHIN JIN WOOK		
发明人	HAN, JUN HAN CHU, HYE YONG LEE, JEONG IK CHO, DOO HEE LEE, JONG HEE LEE, JOO WON SHIN, JIN WOOK		
IPC分类号	H05B33/10		
CPC分类号	H01L27/3288 H01L51/5212 H05B33/10 H01L51/56 H01L51/5228 H05B33/26		
优先权	1020100107660 2010-11-01 KR 1020100032773 2010-04-09 KR		
其他公开文献	US8871563		
外部链接	Espacenet USPTO		

摘要(译)

一种制造有机发光二极管（OLED）平板光源装置的方法。该方法包括在基板上沉积金属层和图案化金属层以形成多个辅助电极，在包括多个辅助电极的基板上形成绝缘层，并通过蚀刻绝缘层形成第一辅助电极层直到一些多个辅助电极的一部分被暴露，并且在其上形成有第一辅助电极层的基板上依次形成阳极，有机发光层（EML）和阴极。