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

(11) EP 3 573 122 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
27.11.2019 Bulletin 2019/48

(21) Application number: **18741015.4**

(22) Date of filing: **18.01.2018**

(51) Int Cl.:
H01L 51/52 *(2006.01)* ***H01L 51/00*** *(2006.01)*
H01L 51/56 *(2006.01)* ***B32B 7/12*** *(2006.01)*
B32B 27/36 *(2006.01)* ***C09J 133/00*** *(2006.01)*

(86) International application number:
PCT/KR2018/000819

(87) International publication number:
WO 2018/135864 (26.07.2018 Gazette 2018/30)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD TN

(30) Priority: **18.01.2017 KR 20170008526**

(71) Applicant: **Samsung Display Co., Ltd.**
Yongin-si
Gyeonggi-do 17113 (KR)

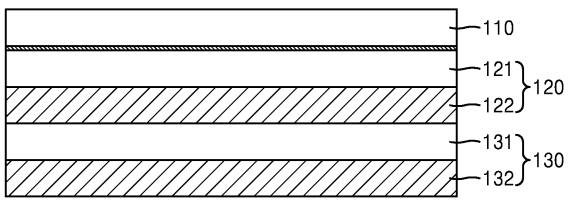
(72) Inventors:
- **CHOI, Young Seo**
  Yongin-si
  Gyeonggi-do 17113 (KR)
- **KIM, Min Ju**
  Yongin-si
  Gyeonggi-do 17113 (KR)
- **KIM, Sang Shin**
  Asan-si
  Chungcheongnam-do 31409 (KR)
- **KIM, Jin Hyuk**
  Asan-si
  Chungcheongnam-do 31409 (KR)
- **PARK, Young Don**
  Asan-si
  Chungcheongnam-do 31409 (KR)
- **BAEK, Young Bin**
  Asan-si
  Chungcheongnam-do 31409 (KR)
- **LEE, Sang Woo**
  Asan-si
  Chungcheongnam-do 31409 (KR)

(74) Representative: **Shearman, James Ward**
Marks & Clerk LLP
15 Fetter Lane
London EC4A 1BW (GB)

(54) **OLED PANEL BOTTOM PROTECTION FILM, AND ORGANIC LIGHT-EMITTING DISPLAY DEVICE COMPRISING SAME**

(57) Provided are a bottom protection film for an OLED panel, and more particularly, to a bottom protection film for an OLED panel, which has excellent alignment process workability and excellent adhesion to an OLED panel, and is capable of preventing static electricity through an antistatic treatment and preventing an electrical short circuit at the same time, and an organic light-emitting display device including the bottom protection film for an OLED panel.

FIG. 1



EP 3 573 122 A1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a bottom protection film for an OLED panel, and more particularly, to a bottom protection film for an OLED panel, the bottom protection film having excellent alignment process workability and excellent adhesion to an OLED panel, and being capable of preventing generation of static electricity through an antistatic treatment and preventing an electrical short circuit, and an organic light-emitting display device including the bottom protection film for an OLED panel.

BACKGROUND ART

[0002] Recently, flat panel displays have been gaining attention as a display device according to the remarkable progress in information communication technology and expansion of the market. Examples of the flat panel displays include liquid crystal displays, plasma display panels, and organic light emitting diodes.

[0003] Organic light emitting devices have advantages such as a high response speed, a light weight, a small thickness, a compact size, low power consumption, self-emitting characteristics, and flexible characteristics, and thus are increasingly demanded for next-generation display devices and flexible displays, and even in illumination.

[0004] An organic light emitting device is manufactured by sequentially depositing, on a glass substrate, a transparent electrode, a hole injection layer, a hole transport layer, an organic emitting layer, an electron transport layer, an electron injection layer, and a metal electrode in an order, and emits light based on the principle that light is emitted by using energy discharged when electrons and holes supplied from both electrodes recombine in the organic emitting layer.

[0005] An organic light-emitting device is likely to deteriorate due to external factors such as external humidity or oxygen or ultraviolet rays, and thus a packaging technique of encapsulating the organic light emitting device is essential, and for applications over a broad range, an organic light-emitting device is required to be thin.

[0006] Meanwhile, a bottom protection film is included under an OLED panel to protect the OLED panel, and a bottom protection film for an OLED panel according to the related art has a high defect rate due to poor alignment process workability, and static electricity and electrical short circuit could not be prevented, and adhesion to the OLED panel was poor.

[0007] Thus, there is the pressing need for research into a bottom protection film for an OLED panel, for which alignment process workability is excellent, and excellent adhesion to an OLED panel is provided, and generation of static electricity may be prevented through antistatic treatment, and also an electrical short circuit may be prevented.

DESCRIPTION OF EMBODIMENTS

TECHNICAL PROBLEM

[0008] The present disclosure provides a bottom protection film for an OLED panel, for which alignment process workability is excellent, and excellent adhesion to an OLED panel is provided, and generation of static electricity may be prevented through antistatic treatment, and also an electrical short circuit may be prevented.

SOLUTION TO PROBLEM

[0009] According to an aspect of the present disclosure, there is provided a bottom protection film for an OLED panel, including: a base film including a first adhesive layer formed on an upper surface of a first base material; a carrier film including a second adhesive layer adhered to a lower surface of the first base material and a second base material adhered to a lower surface of the second adhesive layer; and a liner film adhered using the first adhesive layer, wherein the liner film, the first base material, the first adhesive layer, the second base material, and the second adhesive layer all satisfy Condition (1) and Condition (2) below:

$$100 \leq \frac{a_1}{A} \quad (1),$$

$$23 \leq \frac{a_3}{b_3+c_3}, \ \frac{b_3}{c_3} < 1 \quad (2),$$

where, A denotes the average of the other values except a maximum value and a minimum value of surface resistances from among a_2, b_1, b_2, c_1, and c_2, wherein a_1 denotes a surface resistance (Ω/sq) of the first adhesive layer, a_2 denotes a surface resistance (Ω/sq) of the first base material, b_1 and b_2 respectively denote surface resistance (Ω/sq) of upper and lower surfaces of the liner film, c_1 denotes a surface resistance (Ω/sq) of the second adhesive layer, and c_2 denotes a surface resistance (Ω/sq) of the second base material, and
a_3 denotes an adhesion (gf/in) of the base film, b_3 denotes a releasing force (gf/in) of the liner film, and c_3 denotes an exfoliation force (gf/in) of the carrier film.

ADVANTAGEOUS EFFECTS OF DISCLOSURE

[0010] According to a bottom protection film for an OLED panel of the present disclosure, alignment process workability is excellent, adhesion to an OLED panel is high, and generation of static electricity may be prevented through antistatic treatment, and also an electrical short circuit may be prevented at the same time.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

FIG. 1 is a cross-sectional view of a bottom protection film for an OLED panel, according to an embodiment of the present disclosure.
FIG. 2 is a disassembled cross-sectional view of a bottom protection film for an OLED panel, according to an embodiment of the present disclosure.
FIG. 3 is a cross-sectional view of an organic light-emitting display device according to an embodiment of the present disclosure.

BEST MODE

[0012] According to an embodiment of the present disclosure, a bottom protection film for an OLED panel is provided, the bottom protection film including: a base film including a first adhesive layer formed on an upper surface of a first base material; a carrier film including a second adhesive layer adhered to a lower surface of the first base material and a second base material adhered to a lower surface of the second adhesive layer; and a liner film adhered using the first adhesive layer, wherein the liner film, the first base material, the first adhesive layer, the second base material, and the second adhesive layer all satisfy Condition (1) and Condition (2) below.

$$100 \leq \frac{a_1}{A} \quad (1),$$

$$23 \leq \frac{a_3}{b_3 + c_3}, \quad \frac{b_3}{c_3} < 1 \quad (2).$$

[0013] Provided that, A denotes the average of the other values except a maximum value and a minimum value of surface resistances from among a_2, b_1, b_2, c_1, and c_2, wherein a_1 denotes a surface resistance (Ω/sq) of the first adhesive layer, a_2 denotes a surface resistance (Ω/sq) of the first base material, b_1 and b_2 respectively denote surface resistances (Ω/sq) of upper and lower surfaces of the liner film, c_1 denotes a surface resistance (Ω/sq) of the second adhesive layer, and c_2 denotes a surface resistance (Ω/sq) of the second base material.

[0014] Also, a_3 denotes an adhesion (gf/in) of the base film, b_3 denotes a releasing force (gf/in) of the liner film, and c_3 denotes an exfoliation force (gf/in) of the carrier film.

[0015] According to an embodiment of the present disclosure, the liner film, the first base material, the first adhesive layer, the second base material, and the second adhesive layer may all satisfy Condition (1) and Condition (2) below.

$$10^3 \leq \frac{a_1}{A} \leq 10^5 \quad (1),$$

$$(2)\quad 30 \leq \frac{a_3}{b_3+c_3} \leq 560,\ 0.3 \leq \frac{b_3}{c_3} \leq 0.9$$

[0016] In addition, the first adhesive layer may have a surface resistance of 1.0×10^{10} to 1.0×10^{12} Ω/sq, and the first base material may have a surface resistance of 1.0×10^{5} to 1.0×10^{9} Ω/sq, and upper and lower surfaces of the liner film may respectively have surface resistances of 1.0×10^{5} to 1.0×10^{9} Ω/sq, and the second adhesive layer and the second base material may respectively have surface resistances of 1.0×10^{5} to 1.0×10^{9} Ω/sq.

[0017] Also, the liner film may have a releasing force of 5 gf/in or less.

[0018] Also, an adhesion of the first adhesive layer measured by using a measurement method below may be 250 gf/in or higher.

[Measurement Method]

[0019] The first adhesive layer was adhered to glass, and after 24 hours, adhesion of the first adhesive layer was measured when the first adhesive layer was exfoliated at 180° at a rate of 5 mm per second.

[0020] In addition, an exfoliation force between the base film and the carrier film may be 3 to 10 gf/in.

[0021] In addition, the first base material and the second base material may be a PET base material, and the first adhesive layer and the second adhesive layer may be acrylic adhesive layers.

[0022] In addition, a lower surface of the liner film may be silicon-release treated.

[0023] In addition, at least one surface of each of the liner film, the first base material, and the second base material may be antistatic treated.

[0024] In addition, the first adhesive layer and the second adhesive layer may include an antistatic agent.

[0025] In addition, the first adhesive layer may have a thickness of 10 to 30 μm, and the first base material may have a thickness of 65 to 140 μm.

[0026] In addition, the liner film may have a thickness of 55 to 95 μm, and the second adhesive layer may have a thickness of 1 to 10 μm, and the second base material may have a thickness of 20 to 60 μm.

[0027] Meanwhile, the present disclosure provides a method of applying a bottom protection film for an OLED panel, wherein the method includes: exfoliating a liner film from the bottom protection film for an OLED panel; attaching a base film and a carrier film, from which the liner film is exfoliated, to an OLED panel; and exfoliating the carrier film from the base film and the carrier film that are attached to the OLED panel.

[0028] Meanwhile, the present disclosure provides an organic light-emitting display device including the above-described base film.

MODE OF DISCLOSURE

[0029] Hereinafter, embodiments of the present disclosure will be described in detail with reference to the accompanying drawings, which will be readily apparent to those skilled in the art to which the present disclosure pertains. The present disclosure may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. In the drawings, portions unrelated to the description are omitted for clarity of the present disclosure, and like reference numerals refer to like elements throughout.

[0030] As illustrated in FIG. 1, a bottom protection film for an OLED panel according to an embodiment of the present disclosure includes a base film 120 including a first adhesive layer 121 formed on an upper surface of a first base material 122, a carrier film 130 including a second adhesive layer 131 adhered to a lower surface of the first base material 122 and a second base material 132 adhered to a lower surface of the second adhesive layer 131, and a liner film 110 adhered using the first adhesive layer 121.

[0031] Before describing each layer constituting the bottom protection film for an OLED panel according to the present disclosure as illustrated in FIG. 1, the reason why the bottom protection film for an OLED panel according to the present disclosure, and the liner film 110, the base film 120, the first adhesive layer 121 and the first base material 122 included in the base film 120, the carrier film 130, the second adhesive layer 131 and the second base material 132 included in the carrier film 130 that are included in the bottom protection film for an OLED panel have to satisfy Condition (1) and Condition (2) below will be described first.

[0032] In an OLED panel, to the bottom of which a protection film is attached, when a surface resistance of the protection film is low, electricity flows easily therethrough, and thus, an electrical short circuit is likely to occur; when a surface resistance of the protection film is high, static electricity is likely to occur when attaching a bottom protection film for an OLED panel to the OLED panel, and thus, there is the problem that a base film is also exfoliated when exfoliating a liner film in an alignment process, and this may adversely affect the OLED panel to which the protection film is attached. In

addition, when attaching a protection film to the bottom of the OLED panel, the liner film 110 is first exfoliated, and then the base film 120 and the carrier film 130 stacked on the OLED panel may be attached, and when a releasing force of the liner film 110 is greater than an exfoliation force between the base film 120 and the carrier film 130, exfoliation between the base film 120 and the carrier film 130 is generated and thus workability may be degraded when exfoliating the liner film 110.

[0033] Accordingly, the bottom protection film for an OLED panel should have appropriate surface resistance, releasing force, adhesion, and exfoliation force. The bottom protection film for an OLED panel according to the present disclosure has to satisfy both Condition (1) and Condition (2) below to resolve the problems as described above.

[0034] Condition (1) may be $100 \leq \frac{a_1}{A}$, preferably, $10^3 \leq \frac{a_1}{A} \leq 10^5$, and Condition (2) may be $23 \leq \frac{a_3}{b_3+c_3}$, $\frac{b_3}{c_3} < 1$, preferably, $30 \leq \frac{a_3}{b_3+c_3} \leq 560$, $0.3 \leq \frac{b_3}{c_3} \leq 0.9$.

[0035] Provided that, A denotes the average of the other values except a maximum value and a minimum value of surface resistances from among a_2, b_1, b_2, c_1, and c_2, and a_1 denotes a surface resistance (Ω/sq) of a first adhesive layer, a_2 denotes a surface resistance (Ω/sq) of a first base material, b_1 and b_2 respectively denote surface resistance (Ω/sq) of upper and lower surfaces of a liner film, c_1 denotes a surface resistance (Ω/sq) of a second adhesive layer, and c_2 denotes a surface resistance (Ω/sq) of a second base material. Also, a_3 denotes an adhesion (gf/in) of a base film, b_3 denotes a release force (gf/in) of the liner film, and c_3 denotes an exfoliation force (gf/in) of a carrier film.

[0036] When $\frac{a_1}{A}$ is less than 100 in Condition (1), an electrical short circuit may occur, and alignment process workability may be poor. In addition, when $\frac{a_3}{b_3+c_3}$ is less than 23 in Condition (2), an adhesion of the protection film attached to an OLED panel may be poor, and alignment process workability may be poor. In addition, when $\frac{b_3}{c_3}$ is equal to or greater than 1, and when exfoliating the liner film 110 on the base film 120, exfoliation between the base film 120 and the carrier film 130 may occur, thus significantly increasing a defect rate, accordingly.

[0037] Hereinafter, components included in the bottom protection film for an OLED panel will be described in detail.

[0038] First, the liner film 110 will be described.

[0039] The liner film 110 has a function of protecting an upper surface of the base film 120. In a process of attaching a bottom protection film for an OLED panel according to the present disclosure, to an OLED panel, an alignment process may be performed, and in this case, the liner film 110 is first exfoliated, and then the base film 120 and the carrier film 130 may be attached to the OLED panel.

[0040] Here, in an operation of exfoliating the liner film 110, in order to prevent exfoliation between the base film 120 and the carrier film 130 and improve alignment process workability, surface resistances of upper and lower surfaces of the liner film 110 may be respectively 1.0×10^5 to 1.0×10^9 Ω/sq, preferably, 1.3×10^5 to 8.0×10^8 Ω/sq, to satisfy Condition (1). When the surface resistances of the upper and lower surfaces of the liner film 110 do not satisfy the above ranges, when exfoliating the liner film 110 from the upper surface of the base film 120, exfoliation between the base film 120 and the carrier film 130 may be generated, and this may significantly increase a defect rate and deteriorate alignment process workability.

[0041] Meanwhile, to prevent generation of static electricity, at least a surface of the liner film 110 according to the present disclosure, preferably upper and lower surfaces thereof, may be antistatic treated. Through such an antistatic treatment, generation of static electricity may be prevented and the above-described surface resistance may be achieved, thereby enhancing alignment process workability.

[0042] In addition, in order to prevent exfoliation between the base film 120 and the carrier film 130 while exfoliating the liner film 110, a releasing force of the liner film 110 may be relatively small compared to an exfoliation force between the base film 120 and the carrier film 130, and a releasing force of the liner film 110 may preferably be 5 gf/in or less, more preferably, 2 to 4 gf/in. When the releasing force of the liner film 110 exceeds 5 gf/in, and when exfoliating the liner film 110 from the upper surface of the base film 120, exfoliation between the base film 120 and the carrier film 130 may be generated, and this may significantly increase a defect rate.

[0043] As illustrated in FIG. 2, in order for the liner film 110 to exhibit a releasing force as described above, a lower surface of the liner film 110 may be release-treated (A). In the release treatment above, any material that is typically used in release treatment may be used without limitation, and preferably, releasing may be performed using silicon to

exhibit an appropriate level of releasing force.

[0044] Any material that is typically used in a liner film in the art may be used as the liner film 110 without limitation, and preferably, a PET base material may be used. Also, a thickness of the liner film 110 is not limited as long as the thickness is a thickness of a liner film that may be typically used in a protection film, and may preferably be 55 to 95 μm, more preferably 60 to 90 μm, but is not limited thereto.

[0045] Next, the base film 120 will be described.

[0046] The base film 120 includes the first adhesive layer 121 formed on an upper surface of the first base material 122.

[0047] The base film 120 is directly attached to an OLED panel and has a function of protecting the bottom of the OLED panel. In a process of attaching a bottom protection film for an OLED panel according to the present disclosure, to an OLED panel, an alignment process may be performed, and in this case, the liner film 110 is first exfoliated, and then the base film 120 and the carrier film 130 are attached to the OLED panel, and then the carrier film 130 may be exfoliated to locate a protection film on the bottom of the OLED panel.

[0048] When the protection film is attached to the OLED panel, in order to prevent an electrical short circuit, prevent exfoliation between the base film 120 and the carrier film 130 in an operation of exfoliating the liner film 110, and improve alignment process workability, a surface resistance of the first base material 122 may be 1.0×10^5 to 1.0×10^9 Ω/sq, preferably, 1.3×10^5 to 8.0×10^8 Ω/sq, to satisfy Condition (1). When the surface resistance of the first base material 122 does not satisfy the above ranges, an electrical short circuit may occur, and alignmenr process workability may be degraded.

[0049] Meanwhile, to prevent generation of static electricity, at least one surface of the first base material 122 according to the present disclosure, preferably a lower surface thereof, may be antistatic treated. Through antistatic treatment, generation of static electricity may be prevented and the above-described surface resistance may be obtained, thereby enhancing alignment process workability.

[0050] Any material that is typically used in a protection film in the art may be used as the first base material 122 without limitation, and preferably, a PET base material may be used. In addition, a thickness of the first base material 122 is not limited as long as the thickness may be typically used in a protection film, and may preferably be 65 to 140 μm, more preferably, 70 to 130 μm.

[0051] Meanwhile, when the protection film is attached to the OLED panel, in order to prevent an electrical short circuit, prevent exfoliation between the base film 120 and the carrier film 130 in an operation of exfoliating the liner film 110, and improve alignment process workability, a surface resistance of the first adhesive layer 121 may be 1.0×10^{10} to 1.0×10^{12} Ω/sq, preferably, 1.5×10^{10} to 1.0×10^{11} Ω/sq, to satisfy Condition (1). When the surface resistance of the first adhesive layer 121 does not satisfy the above ranges, an electrical short circuit may occur, and alignment process workability may be degraded.

[0052] The first adhesive layer 121 included in the base film 120 according to the present disclosure may include an antistatic agent to prevent generation of static electricity. By including the antistatic agent, generation of static electricity may be prevented and the above-described surface resistance may be exhibited to thereby enhance alignment process workability.

[0053] Meanwhile, after attaching the bottom protection film for an OLED panel to the bottom of an OLED panel, in order to prevent exfoliation of the protection film attached to the bottom of the OLED panel, an adhesion of the base film 120 has to be sufficiently large, and preferably, to satisfy Condition (2), an adhesion thereof measured using a measurement method below may be 250 gf/in or higher, more preferably, the adhesion may be 1000 to 2300 gf/in.

[Measurement Method]

[0054] The first adhesive layer was adhered to glass, and after 24 hours, an adhesion thereof was measured when the first adhesive layer was exfoliated at 180° at a rate of 5 mm per second.

[0055] When the adhesion of the base film 120 measured using the measurement method is less than 250 gf/in, the base film 120 may be exfoliated from the OLED panel.

[0056] As the first adhesive layer 121 included in the base film 120, any material for typically forming an adhesive layer in the art may be used without limitation, and the first adhesive layer 121 may preferably be an acrylic adhesive layer. In addition, a thickness of the first adhesive layer 121 is not limited as long as the thickness is a thickness of an adhesive layer typically included in a protection film, and may preferably be 10 to 30 μm, more preferably, 12 to 26 μm.

[0057] Detailed description of the first adhesive layer 121 will be provided with reference to a manufacturing method which will be described later.

[0058] Next, the carrier film 130 will be described.

[0059] The carrier film 130 includes the second adhesive layer 131 adhered to a lower surface of the first base material 122 and the second base material 132 adhered to a lower surface of the second adhesive layer 131.

[0060] The carrier film 130 has a function of protecting the bottom of the base film 120 that is directly attached to the OLED panel. In a process of attaching a bottom protection film for an OLED panel according to the present disclosure,

to an OLED panel, an alignment process may be performed, and in this case, the liner film 110 is first exfoliated, and then the base film 120 and the carrier film 130 are attached to the OLED panel, and then the carrier film 130 may be exfoliated to locate a protection film on the bottom of the OLED panel.

[0061] Here, in order to prevent an electrical short circuit and improve alignment process workability, a surface resistance of the second base material 132 may be 1.0×10^5 to 1.0×10^9 Ω/sq, preferably, 1.3×10^5 to 8.0×10^8 Ω/sq, to satisfy Condition (1). When the surface resistance of the second base material 132 does not satisfy the above ranges, an electrical short circuit may occur, and alignment process workability may be degraded.

[0062] Meanwhile, to prevent generation of static electricity, at least one surface of the second base material 132 included in the carrier film 130 according to the present disclosure, preferably, a lower surface thereof, may be antistatic treated. Through antistatic treatment, generation of static electricity may be prevented and the above-described surface resistance may be obtained, thereby enhancing alignment process workability.

[0063] Any material that is typically used in a protection film in the art may be used as the second base material 132 without limitation, and preferably, a PET base material may be used. In addition, a thickness of the second base material 132 is not limited as long as the thickness is typically used in a protection film, and may preferably be 20 to 60 μm, more preferably, 25 to 55 μm.

[0064] Meanwhile, in order to prevent an electrical short circuit and improve alignment process workability, a surface resistance of the second adhesive layer 131 may be 1.0×10^5 to 1.0×10^9 Ω/sq, preferably, 1.3×10^5 to 8.0×10^8 Ω/sq, to satisfy Condition (1). When the surface resistance of the second adhesive layer 131 does not satisfy the above ranges, an electrical short circuit may occur, and alignment process workability may be degraded.

[0065] The second adhesive layer 131 included in the carrier film 130 according to the present disclosure may include an antistatic agent to prevent generation of static electricity. By including the antistatic agent, generation of static electricity may be prevented and the above-described surface resistance may be obtained, thereby enhancing alignment process workability.

[0066] Meanwhile, after exfoliating the liner film 110 first, and attaching the base film 120 and the carrier film 130 to the OLED panel, and then when exfoliating the carrier film 130, in order to prevent exfoliation between the OLED panel and the base film 120, an exfoliation force between the base film 120 and the carrier film 130 may be relatively sufficiently small compared to an adhesion of the first adhesive layer 121 of the base film 120, and preferably, to satisfy Condition (2), an exfoliation force between the base film 120 and the carrier film 130 may be 3 to 10 gf/in, more preferably, 4 to 9 gf/in. When the exfoliation force between the base film 120 and the carrier film 130 does not satisfy the above ranges, in an operation of exfoliating the liner film 110, exfoliation between the base film 120 and the carrier film 130 may occur, and exfoliation between the OLED panel and the base film 120 may occur in an operation of exfoliating the carrier film 130 from the base film 120.

[0067] As the second adhesive layer 131 included in the carrier film 130, any material for typically forming an adhesive layer in the art may be used without limitation, and the second adhesive layer 131 may preferably be an acrylic adhesive layer. In addition, a thickness of the second adhesive layer 131 is not limited as long as the thickness is a thickness of an adhesive layer typically included in a protection film, and may preferably be 1 to 10 μm, more preferably, 2 to 9 μm.

[0068] Detailed description of the second adhesive layer 131 will be provided with reference to a manufacturing method which will be described later.

[0069] The bottom protection film for an OLED panel described above may be manufactured using a manufacturing method to be described later, but is not limited thereto.

[0070] The bottom protection film for an OLED panel according to the present disclosure may be manufactured using a method including: manufacturing a base film 120 by forming a first adhesive layer 121 by coating and curing a first adhesive composition including a first main agent resin, on an upper surface of a first base material 122; manufacturing a carrier film 130 by forming a second adhesive layer 131 by coating and curing a second adhesive composition including a second main agent resin, on an upper surface of a second base material 132; laminating the base film 120 on an upper surface of the carrier film 130; and laminating the liner film 110 on the laminated base film to manufacture a bottom protection film for an OLED panel.

[0071] First, an operation of manufacturing the base film 120 by forming the first adhesive layer 121 by coating and curing a first adhesive composition including a first main agent resin, on an upper surface of the first base material 122 will be described.

[0072] The first adhesive composition may include a first main agent resin, and may further include a first curing agent, a solvent, and an antistatic agent.

[0073] The first main agent resin may be any resin that may be typically used for forming an adhesive layer having a sufficient adhesion, without limitation, and may preferably be an acrylic resin, and more preferably, polybutyl methacrylate, more preferably, polybutyl methacrylate having a weight average molecular weight of 200,000 to 1,000,000, and most preferably, polybutyl methacrylate having a weight average molecular weight of 400,000 to 800,000.

[0074] Also, the first curing agent may be any curing agent that may be used in forming an adhesive layer exhibiting typically sufficient adhesion, without limitation, and preferably, an epoxy curing agent may be used, and more preferably,

an epoxyamine curing agent, and even more preferably, N,N,N,N'-tetraglycidyl-m-xylenediamine may be used. The first curing agent may be included in an amount of 0.02 to 0.08 parts by weight, preferably, 0.03 to 0.07 parts by weight, based on 100 parts by weight of the first main agent resin. When the content of the first curing agent is less than 0.02 parts by weight based on 100 parts by weight of the first main agent resin, the first adhesive layer may not be cured to a target level, and when the content of the first curing agent exceeds 0.08 parts by weight, the first adhesive layer may be excessively cured to lower the adhesion.

[0075] Also, the solvent is not particularly limited as long as it is a solvent that can be used in an adhesive composition for typically forming an adhesive layer, and may preferably include one or more selected from the group consisting of an aqueous solvent, an alcohol solvent, a ketone solvent, an amine solvent, an ester solvent, an acetate solvent, an amide solvent, a halogenated hydrocarbon solvent, an ether solvent, and a furan solvent, and more preferably, one or more selected from the group consisting of an alcohol solvent, a ketone solvent, an amine solvent, an ester solvent, an acetate solvent, and an ether solvent, and may be most preferably methyl ethyl ketone. The solvent may be included, but is not limited to, in an amount of 35 to 55 parts by weight, preferably 40 to 50 parts by weight, based on 100 parts by weight of the first main agent resin.

[0076] The antistatic agent may be any material as long as it prevents static electricity, and preferably, using a pyridine antistatic agent may be useful in preventing static electricity and obtaining a desired surface resistance. The antistatic agent may be included in an amount of 0.5 to 5 parts by weight, preferably, 1 to 4 parts by weight, based on 100 parts by weight of the first main agent resin. When the antistatic agent does not satisfy the above ranges, targeted antistatic effects may not be obtained, and a target surface resistance may not be obtained.

[0077] The base film 120 may be manufactured by forming the first adhesive layer 121 by coating and curing the first adhesive composition described above to the upper surface of the first base material 122 having a lower surface that is antistatic treated.

[0078] Next, an operation of manufacturing the carrier film 130 by forming the second adhesive layer 131 by coating and curing a second adhesive composition including a second main agent resin, on an upper surface of the second base material 132 will be described.

[0079] The second adhesive composition may include a second main agent resin, and may further include a second curing agent, a solvent, and an antistatic agent.

[0080] The second main agent resin may be any resin that may be typically used for forming an adhesive layer having a relatively small adhesion compared with the first adhesive layer, without limitation, and may preferably be an acrylic resin, and more preferably, polymethyl methacrylate, even more preferably, polymethyl methacrylate having a weight average molecular weight of 5,000 to 170,000, and most preferably, polymethyl methacrylate having a weight average molecular weight of 50,000 to 150,000.

[0081] Also, the second curing agent may be any curing agent that may be used for forming an adhesive layer that exhibits a relatively low adhesion compared with the first adhesive layer, without limitation, and preferably, an isocyanate curing agent may be used. The second curing agent may be included in an amount of 2 to 8 parts by weight, preferably, 3 to 7 parts by weight, based on 100 parts by weight of the second main agent resin. When the content of the second curing agent is less than 2 parts by weight based on 100 parts by weight of the second main agent resin, the second adhesive layer may not be cured to a target level, and when the content of the second curing agent exceeds 8 parts by weight, the second adhesive layer may be excessively cured to lower the adhesion.

[0082] Also, the solvent is not particularly limited as long as it is a solvent that can be used in an adhesive composition for typically forming an adhesive layer, and may preferably include one or more selected from the group consisting of an aqueous solvent, an alcohol solvent, a ketone solvent, an amine solvent, an ester solvent, an acetate solvent, an amide solvent, a halogenated hydrocarbon solvent, an ether solvent, and a furan solvent, and more preferably, one or more selected from the group consisting of an alcohol solvent, a ketone solvent, an amine solvent, an ester solvent, an acetate solvent, and an ether solvent, and may be most preferably methyl ethyl ketone. The solvent may be included, but is not limited to, in an amount of 60 to 80 parts by weight, preferably 65 to 75 parts by weight, based on 100 parts by weight of the second main agent resin.

[0083] Also, the antistatic agent may be any material as long as it prevents static electricity, and preferably, using a pyridine antistatic agent may be useful in preventing static electricity and obtaining a desired surface resistance. The antistatic agent may be included in an amount of 0.1 to 0.4 parts by weight, preferably, 0.15 to 0.35 parts by weight, based on 100 parts by weight of the second main agent resin. When the antistatic agent does not satisfy the above ranges, targeted antistatic effects may not be obtained and a target surface resistance may not be obtained.

[0084] Meanwhile, the second adhesive composition may further include a leveling agent and a wetting agent. The leveling agent and the wetting agent may be any material, without limitation, as long as they are typically used in forming an adhesive layer in the art. Preferably, the leveling agent may be polyacrylate, and the wetting agent may be polyether siloxane, but they are not limited thereto. In addition, the leveling agent may be included in an amount of 0.25 to 2.25 parts by weight, preferably, 0.5 to 2 parts by weight, based on 100 parts by weight of the second main agent resin, and the wetting agent may be included in an amount of 0.2 to 0.8 parts by weight, preferably, 0.3 to 0.7 parts by weight,

based on 100 parts by weight of the second main agent resin, but they are not limited thereto.

[0085] The carrier film 130 may be manufactured by forming the second adhesive layer 131 by coating and curing the second adhesive composition described above to the upper surface of the second base material 132 having a lower surface that is antistatic treated.

[0086] Next, an operation of laminating the base film 120 on an upper surface of the carrier film 130 and an operation of laminating the liner film 110 on the laminated base film to manufacture a bottom protection film for an OLED panel will be described.

[0087] Any lamination method that is typically used in the art may be used to laminate the base film 120 on the upper surface of the carrier film 130. Lamination may be performed preferably by using a roll laminator at room temperature, but is not limited thereto.

[0088] Also, the liner film 110 may be used without limitation as long as a lamination method that is typically used in the art is used, and preferably, lamination may be performed at room temperature by using a roll laminator to manufacture a bottom protection film for an OLED panel, but is not limited thereto.

[0089] According to the present disclosure, a method of applying a bottom protection film for an OLED panel according to the present disclosure, to an OLED panel, is provided; in detail, a method of applying a bottom protection film for an OLED panel is provided, the method including: exfoliating a liner film from the bottom protection film for an OLED panel; attaching a base film and a carrier film, from which the liner film is exfoliated, to an OLED panel; and exfoliating the carrier film from the base film and the carrier film that are attached to the OLED panel.

[0090] First, a first alignment process may be performed to exfoliate the liner film from the bottom protection film for an OLED panel, and the liner film may be exfoliated from the bottom protection film for an OLED panel by irradiating light of a wavelength of 400 to 700 nm and sensing reflected light. Here, when the base film and the carrier film do not show an appropriate level of exfoliation force, instead of exfoliation of the liner film, exfoliation between the base film and the carrier film may occur, and this may increase a defect rate.

[0091] In addition, a second alignment process may be performed to attach, to the OLED panel, the base film and the carrier film, from which the liner film is exfoliated and the base film and the carrier film may be attached to the OLED panel by irradiating light of a wavelength of 400 to 700 nm and sensing reflected light.

[0092] Next, a third alignment process may be performed to exfoliate the carrier film from the base film and the carrier film that are attached to the OLED panel, and the bottom protection film for an OLED panel may be attached to the bottom of the OLED panel by exfoliating the carrier film from the base film and the carrier film attached to the OLED panel by irradiating light of a wavelength of 400 to 700 nm and sensing reflected light.

[0093] Meanwhile, the present disclosure includes an organic light-emitting display device 10 implemented by including the above-described base film.

[0094] As in FIG. 3, the organic light-emitting display device 10 may include the base film 120" attached to the bottom of an OLED panel 300. Here, the OLED panel 300 includes a substrate and an organic light-emitting device arranged on the substrate. The organic light-emitting device may be provided by stacking a first electrode, an intermediate layer including an organic emitting layer, and a second electrode. The base film 120" may be attached to the bottom of the substrate of the OLED panel 300. In detail, as the base film 120" including a first adhesive layer 121" having a sufficient adhesion and a first base material 122" having a function of protecting the OLED panel 300 is included, the bottom of the OLED panel 300 may be protected, and generation of static electricity of the OLED panel 300 may be prevented.

[0095] Meanwhile, according to the bottom protection film for an OLED panel of the present disclosure, alignment process workability thereof may be excellent, an adhesion to an OLED panel may be excellent, and generation of static electricity may be prevented through antistatic treatment, and also an electrical short circuit may be prevented at the same time.

[0096] The present disclosure will be described in more detail with reference to embodiments thereof below but the scope of the present disclosure is not limited by the embodiments, which shall be interpreted as being provided to help to understand the present disclosure.

<Example 1>

(1) Manufacture of Base Film and Liner Film Lamination

[0097] A first adhesive composition was prepared by mixing polybutyl methacrylate (BURIM CHEMICAL, BA8900) having a weight average molecular weight of 600,000 as a first main agent resin, 0.05 parts by weight of N,N,N,N'-tetraglycidyl-m-xylenediamine (BURIM CHEMICAL, 45S) as a first curing agent, 2.5 parts by weight of a pyridine antistatic agent (KOEI, IL-P14-2) as an antistatic agent, and 45 parts by weight of methyl ethyl ketone (MEK) as a solvent, based on 100 parts by weight of the first main agent resin.

[0098] A base film was manufactured by coating the first adhesive composition on an upper surface of the first base material that is antistatic-treated by coating a thin film of PEDOT/PSS (poly (3,4-ethylenedioxythiophene) polystyrene

sulfonate) on a lower surface of a PET base material having a thickness of 75 μm, and an upper surface and the lower surface of the PET base material having a thickness of 75 μm were coated with a thin film of PEDOT/PSS (poly (3,4-ethylenedioxythiophene) polystyrene sulfonate) to antistatic-treat the PET base material, and a thin film of a silicon releasing agent was coated on a lower surface of the liner film to silicon release-treat the liner film, and then the liner film was laminated using a roll laminator at room temperature and cured at 50°C for 48 hours to manufacture the base film including the first adhesive layer having a thickness of 13 μm and the liner film stacked on the base film.

(2) Manufacture of Carrier Film

[0099] A second adhesive composition was prepared by mixing polymethyl methacrylate (SUSAN POLYMER Co., Ltd., SA609) having a weight average molecular weight of 100,000 as a second main agent resin, 5 parts by weight of polyisocyanate (SUSAN POLYMER Co., Ltd., SAX802) as a second curing agent, 0.25 parts by weight of a pyridine antistatic agent (KOEI, IL-P14-2) as an antistatic agent, 1.25 parts by weight of polyacrylate (BYK, BYK361N) as a leveling agent, polyether siloxane (TEGO, WET270) as a wetting agent, and 70 parts by weight of methyl ethyl ketone (MEK) as a solvent, based on 100 parts by weight of the second main agent resin.

[0100] The second adhesive composition was coated on the upper surface of the second base material that is antistatic-treated by coating a thin film of PEDOT/PSS (poly (3,4-ethylenedioxythiophene) polystyrene sulfonate) on a lower surface of a PET base material having a thickness of 38 μm, and cured at 50°C for 48 hours to prepare a carrier film including a second adhesive layer having a thickness of 5 μm.

(3) Manufacture of OLED Bottom Protection Film

[0101] The base film and the carrier film that are laminated with the liner film were laminated at 25°C by using a roll laminator to manufacture an OLED bottom protection film.

<Examples 2 through 20 and Comparative examples 1 through 4>

[0102] An OLED panel bottom protection film as shown in Tables 1 through 5 was manufactured in the same manner as Example 1 except by modifying conditions such as the weight average molecular weight of the first main agent resin or the second main agent resin, whether or not to perform release treatment on the lower surface of the liner film, the content of the antistatic agent in the first adhesive composition and the second adhesive composition, whether to perform antistatic treatment on the first base material, the second base material, and the liner film, or the like.

<Experimental Example 1>

1. Measurement of Surface Resistance Value

[0103] Surface resistance values of the upper surface and the lower surface of each of the liner film, the base film, and the carrier film of the bottom protection film for an OLED panel manufactured according to Examples and Comparative Examples were measured.

[0104] A measurement probe of a 2-point probe was brought into contact with a surface to be measured, by using a surface resistance measurement device (TREK, 152-1), at an evaluation voltage of 10V, for 5 seconds, and a measured value was recorded and listed in Tables 1 through 5 below.

2. Evaluation of Releasing Force, Adhesion, and Exfoliation Force

[0105] Regarding the bottom protection film for an OLED panel manufactured according to Examples and Comparative Examples, a 1 inch width of the bottom protection film for an OLED panel was cut and then the bottom protection film was exfoliated at a rate of 40 mm per second at 180° to measure a liner releasing force. A 1 inch width of the bottom protection film for an OLED panel was cut to remove the liner film. Then the bottom protection film was attached to glass having a cleaned surface, and exfoliated, after 24 hours, at a rate of 5 mm per second at 180° to measure an adhesion of the first adhesive layer. A 1 inch width of each of the base film and the carrier film were cut and the carrier film was exfoliated at a rate of 40 mm per second at 180° to measure an exfoliation force between the base film and the carrier film. The measurement result is shown in Tables 1 through 5.

3. Evaluation of Workability of Alignment Process

[0106] Workability of an operation of aligning the bottom protection film manufactured according to Examples and

Comparative examples, to an OLED panel, was evaluated.

[0107] In the first alignment process of exfoliating the liner film from the bottom protection film for an OLED panel, when exfoliating the liner film, workability of the first alignment process was evaluated by marking - ○ when only the liner film was exfoliated and marking - x when exfoliation between the base film and the carrier film was generated. Also, workability of the carrier film removing operation (third alignment process) was evaluated by marking - ○ when the carrier film was exfoliated by performing the exfoliation once and by marking - × when the carrier film was exfoliated by performing the exfoliation twice or more in the operation of exfoliating the carrier film from the base film and the carrier film attached to the OLED panel. The evaluation result is shown in Tables 1 through 5 below.

4. Adhesive Performance of Bottom Protection Film for OLED Panel

[0108] The bottom protection film for an OLED panel manufactured according to Examples and Comparative Examples was attached to an OLED panel at room temperature by using a roll laminator, and after 24 hours, the bottom protection film for an OLED panel was left at a temperature of 60°C and a humidity of 90% and for 500 hours to identify whether the attached bottom protection film was exfoliated. The adhesive performance of the base film was evaluated by marking - ○ when exfoliation did not occur and marking - x when exfoliation occurred. The evaluation result is shown in Tables 1 through 5.

5. Evaluation of Generation of Electrical Short Circuit

[0109] The bottom protection film for an OLED panel manufactured according to Examples and Comparative Examples was attached to a chip on film circuit used as a circuit portion of an OLED panel at 25°C by using a roll laminator, and then whether an electrical circuit is generated when a current is applied to the circuit portion under the condition of a temperature of 60°C and humidity of 90%. The electrical short circuit was evaluated by marking - ○ when an electrical short circuit did not occur and marking - x when an electrical short circuit occurred. This is shown in Tables 1 through 5.

[Table 1]

Division		Example 1	Example 2	Example 3	Example 4	Example 5
first adhesive composition	first main agent resin weight average molecular weight	600,000	400,000	800,000	600,000	600,000
	antistatic agent (parts by weight)	2.5	2.5	2.5	2.5	2.5
second adhesive composition	second main agent resin weight average molecular weight	100,000	100,000	100,000	50,000	150,000
	antistatic agent (parts by weight)	0.25	0.25	0.25	0.25	0.25
Whether release treatment is performed on lower surface of liner film		○	○	○	○	○
whether antistatic treatment is performed	lower surface of first base material	○	○	○	○	○
	lower surface of second base material	○	○	○	○	○
	upper surface of liner film	○	○	○	○	○
	lower surface of liner film	○	○	○	○	○

(continued)

Division		Example 1	Example 2	Example 3	Example 4	Example 5
surface resistance	first adhesive layer (Ω/sq)	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}
	first base material (Ω/sq)	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}
	upper surface of liner film(Ω/sq)	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}
	lower surface of liner film(Ω/sq)	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}
	second adhesive layer(Ω/sq)	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}
	second base material(Ω/sq)	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}
Condition 1	a_1/A 1)	3402.2	3402.2	3402.2	3402.2	3402.2
releasing force of liner film(gf/in)		3.2	3.2	3.2	3.2	3.2
Adhesion of first adhesive layer (gf/in)		1680	1029	2263	1680	1680
Exfoliation force of base film/carrier film (gf/in)		6.6	6.6	6.6	4.1	8.8
Condition 2	$a_3/(b_3+c_3)$	171.4	105	230.9	230.1	140
	b_3/c_3	0.48	0.48	0.48	0.78	0.36
workability	first alignment	○	○	○	○	○
	third alignment	○	○	○	○	○
adhesive performance of base film		○	○	○	○	○
evaluation of electrical short circuit		○	○	○	○	○
1) A refers to the average of the other values of the surface resistance of the first base material, the upper surface of the liner film, the lower surface of the liner film, the second adhesive layer, and the second base material, except for a maximum value and a minimum value of the surface resistance.						

[Table 2]

Division		Example 6	Example 7	Example 8	Example 9	Example 10
first adhesive composition	first main agent resin weight average molecular weight	600,000	600,000	600,000	600,000	600,000
	antistatic agent (parts by weight)	2.5	1	4	7	2.5
second adhesive composition	second main agent resin weight average molecular weight	220,000	100,000	100,000	100,000	100,000
	antistatic agent (parts by weight)	0.25	0.25	0.25	0.25	0.03
whether release treatment is performed on		○	○	○	○	○
lower surface of liner film						

(continued)

Division		Example 6	Example 7	Example 8	Example 9	Example 10
whether antistatic treatment is performed	lower surface of first base material	○	○	○	○	○
	lower surface of second base material	○	○	○	○	○
	upper surface of liner film	○	○	○	○	○
	lower surface of liner film	○	○	○	○	○
surface resistance	first adhesive layer (Ω/sq)	3.13×10^{10}	1.5×10^{10}	1.0×10^{11}	1.3×10^{12}	3.13×10^{10}
	first base material(Ω/sq)	$2.5 \times 10^{7}7$	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}
	upper surface of liner film(Ω/sq)	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}
	lower surface of liner film (Ω/sq)	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}
	second adhesive layer (Ω/sq)	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}	8.2×10^{4}
	second base material (Ω/sq)	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}
Condition 1	a_1/A[1)]	3402.2	1630.4	10869.6	141304	32947.4
releasing force of liner film(gf/in)		3.2	3.2	3.2	3.2	3.2
adhesion of first adhesive layer (gf/in)		1680	1680	1680	1680	1680
exfoliation force of base film/carrier film (gf/in)		12.2	6.6	6.6	6.6	6.6
Condition 2	$a_3/(b_3+c_3)$	109.1	171.4	171.4	171.4	171.4
	b_3/c_3	0.26	0.48	0.48	0.48	0.48
workability	first alignment	○	○	○	×	○
	third alignment	×	○	○	○	○
adhesive performance of base film		○	○	○	○	○
evaluation of electrical short circuit		○	○	○	○	×

1) A refers to the average of the other values of the surface resistance of the first base material, the upper surface of the liner film, the lower surface of the liner film, the second adhesive layer, and the second base material, except for a maximum value and a minimum value of the surface resistance.

[Table 3]

Division		Example 11	Example 12	Example 13	Example 14	Example 15
first adhesive composition	weight average molecular weight of first main agent resin	600,000	600,000	600,000	600,000	600,000
	antistatic agent (parts by weight)	2.5	2.5	2.5	2.5	2.5

(continued)

Division		Example 11	Example 12	Example 13	Example 14	Example 15
second adhesive composition	weight average molecular weight of second main agent resin	100,000	100,000	100,000	100,000	100,000
	antistatic agent (parts by weight)	0.15	0.35	1	0.25	0.25
whether release treatment is performed on lower surface of liner film		○	○	○	○	○
whether antistatic treatment is performed	lower surface of first base material	○	○	○	×	○
	lower surface of second base material	○	○	○	○	×
	upper surface of liner film	○	○	○	○	○
	lower surface of liner film	○	○	○	○	○
surface resistance	first adhesive layer (Ω/sq)	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}
	first base material (Ω/sq)	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}	9.1×10^{4}	2.5×10^{7}
	upper surface of liner film(Ω/sq)	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}
	lower surface of liner film(Ω/sq)	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}
	second adhesive layer(Ω/sq)	2.7×10^{5}	8.0×10^{8}	1.8×10^{9}	4.7×10^{8}	4.7×10^{8}
	second base material(Ω/sq)	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}	9.3×10^{4}
Condition 1	a_1/A[1)]	32717.8	3402.2	3402.2	32947.3	3675.1
releasing force of liner film(gf/in)		3.2	3.2	3.2	3.2	3.2
adhesion of first adhesive layer (gf/in)		1680	1680	1680	1680	1680
exfoliation force of base film/carrier film (gf/in)		6.6	6.6	6.6	6.8	6.6
Condition 2	$a_3/(b_3+c_3)$	171.4	171.4	171.4	168	171.4
	b_3/c_3	0.48	0.48	0.48	0.47	0.48
workability	first alignment	○	○	○	○	○
	third alignment	○	○	×	○	○
adhesive performance of base film		○	○	○	○	○
evaluation of electrical short circuit		○	○	○	×	×

1) A refers to the average of the other values of the surface resistance of the first base material, the upper surface of the liner film, the lower surface of the liner film, the second adhesive layer, and the second base material, except for a maximum value and a minimum value of the surface resistance.

[Table 4]

Division		Example 16	Example 17	Example 18	Example 19	Example 20
first adhesive composition	first main agent resin weight average molecular weight	600,000	600,000	600,000	600,000	600,000
	antistatic agent (parts by weight)	2.5	2.5	2.5	2.5	0.1
second adhesive	second main agent resin	100,00	100,00	100,00	100,00	100,00
composition	weight average molecular weight	0	0	0	0	0
	antistatic agent (parts by weight)	0.25	0.25	0.25	0.25	0.03
whether release treatment is performed on lower surface of liner film		○	○	○	○	○
whether antistatic treatment is performed	lower surface of first base material	○	○	×	○	○
	lower surface of second base material	○	○	×	○	○
	upper surface of liner film	×	○	○	×	○
	lower surface of liner film	○	×	○	×	○
surface resistance	first adhesive layer (Ω/sq)	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}	3.13×10^{10}	6.4×10^{8}
	first base material (Ω/sq)	2.5×10^{7}	2.5×10^{7}	9.1×10^{4}	2.5×10^{7}	2.5×10^{7}
	upper surface of liner film(Ω/sq)	8.8×10^{4}	2.5×10^{5}	2.5×10^{5}	8.8×10^{4}	2.5×10^{5}
	lower surface of liner film(Ω/sq)	3.0×10^{5}	8.6×10^{4}	3.0×10^{5}	8.6×10^{4}	3.0×10^{5}
	second adhesive layer(Ω/sq)	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}	8.2×10^{4}
	second base material(Ω/sq)	2.3×10^{6}	2.3×10^{6}	9.3×10^{4}	2.3×10^{6}	2.3×10^{6}
Condition 1	a_1/A [1)]	3402.2	3402.2	146490	3428.5	673.7
releasing force of liner film(gf/in)		3.2	3.4	3.2	3.4	3.2
adhesion of first adhesive layer (gf/in)		1680	1680	1680	1680	1680
exfoliation force of base film/carrier film (gf/in)		6.6	6.6	6.8	6.6	6.6
Condition 2	$a_3/(b_3+c_3)$	171.4	168	168	168	171.4
	b_3/c_3	0.48	0.52	0.47	0.52	0.48
workability	first alignment	○	○	○	○	○

(continued)

Division		Example 16	Example 17	Example 18	Example 19	Example 20
	third alignment	○	○	○	○	○
adhesive performance of base film		○	○	○	○	○
evaluation of electrical short circuit		×	×	×	×	×
1) A refers to the average of the other values of the surface resistance of the first base material, the upper surface of the liner film, the lower surface of the liner film, the second adhesive layer, and the second base material, except for a maximum value and a minimum value of the surface resistance.						

[Table 5]

Division		Comparative example1	Comparative example2	Comparative example3	Comparative example4
first adhesive composition	first main agent resin weight average molecular weight	100,000	600,000	600,000	600,000
	antistatic agent (parts by weight)	2.5	2.5	2.5	0.1
second adhesive composition	second main agent resin weight average molecular weight	100,000	4,000	100,000	100,000
	antistatic agent (parts by weight)	0.25	0.25	0.25	0.25
Whether release treatment is performed on lower surface of liner film		○	○	×	○
whether antistatic treatment is performed	lower surface of first base material	○	○	○	○
	lower surface of second base material	○	○	○	○
	upper surface of liner film	○	○	○	○
	lower surface of liner film	○	○	○	○
surface	first adhesive	3.13	3.13	3.13	6.4

(continued)

Division		Comparative example1	Comparative example2	Comparative example3	Comparative example4
resistance	layer(Ω/sq)	$\times 10^{10}$	$\times 10^{10}$	$\times 10^{10}$	$\times 10^{8}$
	first base material (Ω/sq)	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}	2.5×10^{7}
	upper surface of liner film(Ω/sq)	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}	2.5×10^{5}
	lower surface of liner film(Ω/sq)	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}	3.0×10^{5}
	second adhesive layer(Ω/sq)	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}	4.7×10^{8}
	second base material(Ω/sq)	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}	2.3×10^{6}
Condition 1	$a_1/A^{1)}$	3402.2	3402.2	3402.2	69.6
releasing force of liner film(gf/in)		3.2	3.2	9.8	3.2
Adhesion of first adhesive layer (gf/in)		207	1680	1680	1680
Exfoliation force of base film/carrier film (gf/in)		6.6	1.3	6.6	6.6
Condition 2	$a_3/(b_3+c_3)$	21.12	373.3	102.4	171.4
	b_3/c_3	0.48	2.46	1.68	0.48
workability	first alignment	○	×	×	○
	third alignment	○	○	○	○
adhesive performance of base film		×	○	○	○
evaluation of electrical short circuit		○	○	○	×
1) A refers to the average of the other values of the surface resistance of the first base material, the upper surface of the liner film, the lower surface of the liner film, the second adhesive layer, and the second base material, except for a maximum value and a minimum value of the surface resistance.					

[0110] As shown in Tables 1 through 5,
Examples 1 through 5, 7, 8, 11, and 12 that satisfy the preferable conditions according to the present disclosure, which are related to the weight average molecular weight of the first main agent resin, the second main agent resin, whether the lower surface of the liner film is release-treated, the content of the antistatic agent in the first adhesive composition and the second adhesive composition, whether the first base material, the second base material, and the liner film are antistatic treated, exhibited excellent alignment process workability, excellent adhesive performance of the base film, and also the capability of preventing an electrical short circuit at the same time, compared to Examples 6, 9, 10, 13 through 20 and Comparative Examples 1 through 4 where at least one of the above conditions was omitted.

[0111] In detail, Examples 1, 4, and 5 that satisfy the weight average molecular weight of the second main agent resin according to the present disclosure exhibited excellent alignment process workability compared to Example 6 where the weight average molecular weight of the second main agent resin was not met.

[0112] In addition, in Examples 1, 7, and 8 that satisfy the content of the antistatic agent included in the first adhesive composition according to the present disclosure, excellent alignment process workability compared to Example 9, which did not satisfy the condition of the content of the antistatic agent, was exhibited.

[0113] In addition, in Examples 1, 11, and 12 that satisfy the content of the antistatic agent included in the second adhesive composition according to the present disclosure, no electrical short circuit occurred compared to Example 10, which did not meet the condition of the content of the antistatic agent, and also, excellent alignment process workability was exhibited compared to Example 13.

[0114] In addition, in Example 1 in which antistatic treatment was performed on the lower surface of the first base material, the lower surface of the second base material, and the upper and lower surfaces of the liner film, no electrical

short circuit occurred compared to Examples 14 through 19 in which the antistatic treatment was omitted on at least one of the lower surface of the first base material, the lower surface of the second base material, and the upper and lower surfaces of the liner film.

[0115] In addition, in Example 1 that satisfies the content of the antistatic agent included in the first adhesive composition and the content of the antistatic agent included in the second adhesive composition, according to the present disclosure, no electrical short circuit occurred compared to Example 20 where the contents were not satisfied.

[0116] In addition, Examples 1 through 3 that satisfy the weight average molecular weight of the first main agent resin according to the present disclosure exhibited excellent adhesive performance of the base film compared to Comparative Example 1 where the weight average molecular weight of the first main agent resin was not met.

[0117] In addition, Examples 1, 4, and 5 that satisfy the weight average molecular weight of the second main agent resin according to the present disclosure exhibited excellent alignment process workability compared to Comparative Example 2 where the weight average molecular weight of the second main agent resin was not satisfied.

[0118] In addition, Example 1 in which a releasing treatment was performed on the lower surface of the liner film according to the present disclosure exhibited excellent alignment process workability compared with Comparative Example 3 in which no release treatment was performed.

[0119] In addition, in Examples 1, 7 and 8 that satisfy the content of the antistatic agent included in the first adhesive composition according to the present disclosure, no electrical short circuit occurred compared to Comparative Example 4 which did not satisfy the content of the antistatic agent.

[0120] While the present disclosure has been particularly shown and described with reference to exemplary embodiments thereof, it is to be understood that the present disclosure is not limited to the disclosed exemplary embodiments, It will be understood by those skilled in the art that various changes such as addition, modification, elimination, or supplementation may be made therein to easily suggest other embodiments, without departing from the spirit and scope of the disclosure as defined by the appended claims.

Claims

1. A bottom protection film for an OLED panel, comprising:

a base film including a first adhesive layer disposed on an upper surface of a first base material;
a carrier film including a second adhesive layer adhered to a lower surface of the first base material and a second base material adhered to a lower surface of the second adhesive layer; and
a liner film adhered using the first adhesive layer,
wherein the liner film, the first base material, the first adhesive layer, the second base material, and the second adhesive layer all satisfy Condition (1) and Condition (2) below:

$$100 \leq \frac{a_1}{A} \quad (1),$$

$$23 \leq \frac{a_3}{b_3 + c_3}, \quad \frac{b_3}{c_3} < 1 \quad (2),$$

where, A denotes the average of the other values except for a maximum value and a minimum value of surface resistances from among a_2, b_1, b_2, c_1, and c_2, and a_1 denotes a surface resistance (Ω/sq) of the first adhesive layer, a_2 denotes a surface resistance (Ω/sq) of the first base material, b_1 and b_2 respectively denote surface resistances (Ω/sq) of upper and lower surfaces of the liner film, c_1 denotes a surface resistance (Ω/sq) of the second adhesive layer, and c_2 denotes a surface resistance (Ω/sq) of the second base material, and
a_3 denotes adhesion (gf/in) of the base film, b_3 denotes a release force (gf/in) of the liner film, and c_3 denotes an exfoliation force (gf/in) of the carrier film.

2. The bottom protection film for an OLED panel of claim 1, wherein the liner film, the first base material, the first adhesive layer, the second base material, and the second adhesive layer all satisfy Condition (1) and Condition (2) below:

(1) $$10^3 \leq \frac{a_1}{A} \leq 10^5,$$

(2) $$30 \leq \frac{a_3}{b_3 + c_3} \leq 560, \quad 0.3 \leq \frac{b_3}{c_3} \leq 0.9.$$

3. The bottom protection film for an OLED panel of claim 1, wherein a surface resistance of the first adhesive layer is 1.0×10^{10} to 1.0×10^{12} Ω/sq, and
a surface resistance of the first base material is 1.0×10^{5} to 1.0×10^{9} Ω/sq, and
surface resistances of the upper and lower surfaces of the liner film are respectively 1.0×10^{5} to 1.0×10^{9} Ω/sq, and
surface resistances of the second adhesive layer and the second base material are respectively 1.0×10^{5} to 1.0×10^{9} Ω/sq.

4. The bottom protection film for an OLED panel of claim 1, wherein the liner film has a releasing force of 5 gf/in or less.

5. The bottom protection film for an OLED panel of claim 1, wherein adhesion of the first adhesive layer measured by using a measurement method below is 250 gf/in or higher:
[Measurement Method]
The first adhesive layer is adhered to glass, and after 24 hours, an adhesion of the first adhesive layer is measured when the first adhesive layer is exfoliated at 180° at a rate of 5 mm per second.

6. The bottom protection film for an OLED panel of claim 1, wherein an exfoliation force between the base film and the carrier film is 3 to 10 gf/in.

7. The bottom protection film for an OLED panel of claim 1, wherein the first base material and the second base material are a PET base material, and
the first adhesive layer and the second adhesive layer are acrylic adhesive layers.

8. The bottom protection film for an OLED panel of claim 1, wherein a lower surface of the liner film is silicon release-treated.

9. The bottom protection film for an OLED panel of claim 1, wherein at least one surface of each of the liner film, the first base material, and the second base material is antistatic treated.

10. The bottom protection film for an OLED panel of claim 1, wherein the first adhesive layer and the second adhesive layer comprise an antistatic agent.

11. The bottom protection film for an OLED panel of claim 1, wherein the first adhesive layer has a thickness of 10 to 30 μm, and the first base material has a thickness of 65 to 140 μm.

12. The bottom protection film for an OLED panel of claim 1, wherein the liner film has a thickness of 55 to 95 μm, and wherein the second adhesive layer has a thickness of 1 to 10 μm, and
wherein the second base material has a thickness of 20 to 60 μm.

13. A method of applying a bottom protection film for an OLED panel, the method comprising:

exfoliating a liner film from the bottom protection film for an OLED panel;
attaching, to the OLED panel, a base film and a carrier film, from which the liner film is exfoliated; and
exfoliating the carrier film from the base film and the carrier film that are attached to the OLED panel,
wherein the bottom protection film for an OLED panel comprises:

a base film comprising a first adhesive layer formed on an upper surface of a first base material;
a carrier film comprising a second adhesive layer adhered to a lower surface of the first base material and a second base material adhered to a lower surface of the second adhesive layer; and
a liner film adhered using the first adhesive layer,

wherein the liner film, the first base material, the first adhesive layer, the second base material, and the second adhesive layer all satisfy Condition (1) and Condition (2) below,

$$(1)\quad 100 \leq \frac{a_1}{A},$$

$$(2)\quad 23 \leq \frac{a_3}{b_3+c_3},\ \frac{b_3}{c_3} < 1,$$

where, A denotes the average of the other values except for a maximum value and a minimum value of surface resistances from among a_2, b_1, b_2, c_1, and c_2, and a_1 denotes a surface resistance (Ω/sq) of the first adhesive layer, a_2 denotes a surface resistance (Ω/sq) of the first base material, b_1 and b_2 respectively denote surface resistance (Ω/sq) of upper and lower surfaces of the liner film, c_1 denotes a surface resistance (Ω/sq) of the second adhesive layer, and c_2 denotes a surface resistance (Ω/sq) of the second base material, and

a_3 denotes adhesion (gf/in) of the base film, b_3 denotes a release force (gf/in) of the liner film, and c_3 denotes an exfoliation force (gf/in) of the carrier film.

14. An organic light-emitting display device comprising a base film and an OLED panel,
wherein the OLED panel comprises a substrate and an organic light-emitting device arranged on the substrate, and the base film comprises a base material and an adhesive layer arranged on an upper surface of the base material, and
wherein a surface resistance of the adhesive layer is 1.0×10^{10} to 1.0×10^{12} Ω/sq, and
a surface resistance of the base material is 1.0×10^{5} to 1.0×10^{9} Ω/sq.

15. The organic light-emitting display device of claim 14, wherein an adhesion of the adhesive layer measured by using a measurement method below is 250 gf/in or higher:
[Measurement Method]
The adhesive layer was adhered to glass, and after 24 hours, an adhesion of the adhesive layer was measured when the adhesive layer was exfoliated at 180° at a rate of 5 mm per second.

16. The organic light-emitting display device of claim 14, wherein the base material is a PET base material, and the adhesive layer is an acrylic adhesive layer.

17. The organic light-emitting display device of claim 14, wherein at least one surface of the base material is antistatic treated.

18. The organic light-emitting display device of claim 14, wherein the adhesive layer comprises an antistatic agent.

19. The organic light-emitting display device of claim 14, wherein the adhesive layer has a thickness of 10 to 30 μm, and the first base material has a thickness of 65 to 140 μm.

20. The organic light-emitting display device of claim 14, wherein the adhesive layer comprises polybutyl methacrylate and a pyridine antistatic agent,
wherein a thin film including PEDOT/PSS (poly(3,4-ethylene dioxythiophene) polystyrene sulfonate) is coated on a lower surface of the base material.

FIG. 1

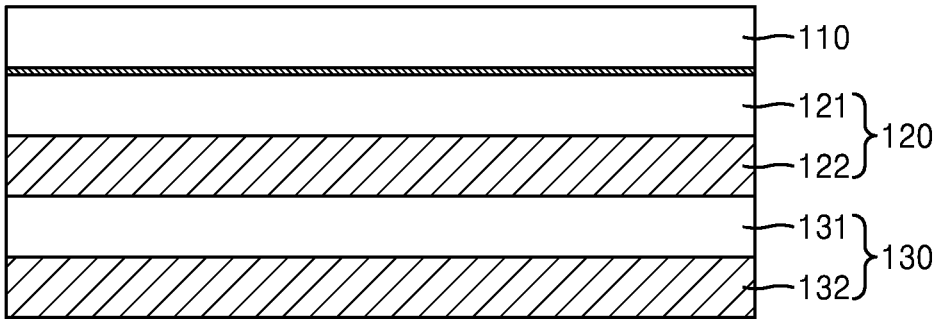


FIG. 2

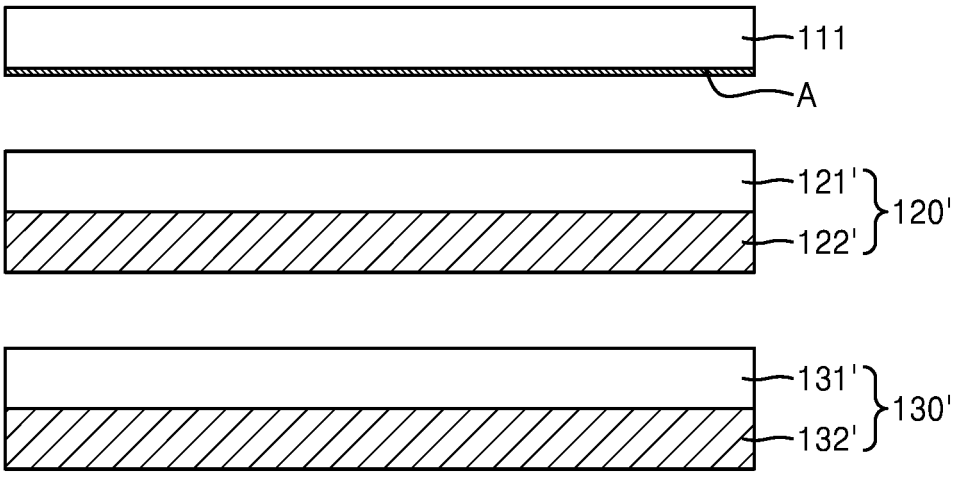
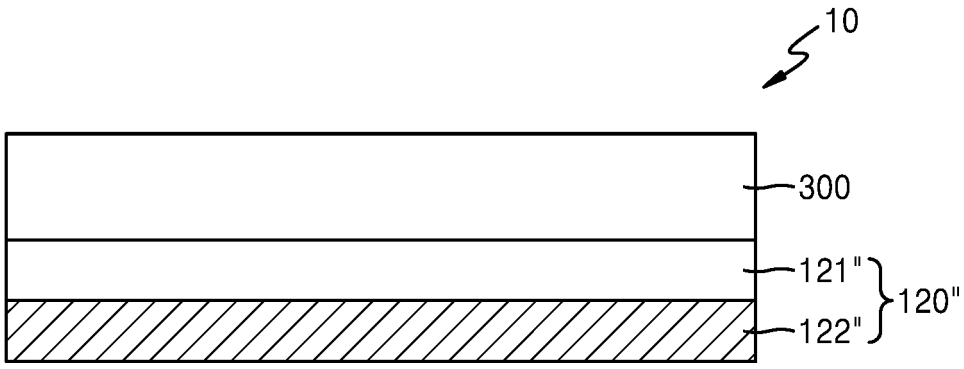


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2018/000819

A. CLASSIFICATION OF SUBJECT MATTER
H01L 51/52(2006.01)i, H01L 51/00(2006.01)i, H01L 51/56(2006.01)i, B32B 7/12(2006.01)i, B32B 27/36(2006.01)i, C09J 133/00(2006.01)i
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01L 51/52; H01L 21/60; H01J 9/18; H05B 33/22; H01J 1/62; G02B 5/20; H01L 51/56; H01J 11/44; H01L 51/00; B32B 7/12; B32B 27/36; C09J 133/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS (KIPO internal) & Keywords: OLED, film, adhesive, board, surface resistance

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2005-0019451 A (LG ELECTRONICS INC.) 03 March 2005 See paragraphs [0018]-[0026] and figure 3.	1-20
A	KR 10-2014-0043022 A (SAMSUNG DISPLAY CO., LTD.) 08 April 2014 See paragraphs [0039]-[0062] and figure 1.	1-20
A	KR 10-2007-0069580 A (SAMSUNG CORNING CO., LTD.) 03 July 2007 See figure 1 and claim 1.	1-20
A	KR 10-2007-0101711 A (AN, Seung Bae) 17 October 2007 See figure 1 and claim 1.	1-20
A	US 2012-0038267 A1 (HANAMURA, Yuki et al.) 16 February 2012 See figure 4 and claim 1.	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 APRIL 2018 (30.04.2018)	**30 APRIL 2018 (30.04.2018)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. +82-42-481-8578	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2018/000819

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 10-2005-0019451 A	03/03/2005	CN 1585583 A	23/02/2005
		CN 1585583 B	12/05/2010
		CN 1585583 C	23/02/2005
		EP 1511095 A2	02/03/2005
		EP 1511095 A3	23/02/2011
		JP 2005-063976 A	10/03/2005
		KR 10-2005-0102387 A	26/10/2005
		US 2005-0040763 A1	24/02/2005
KR 10-2014-0043022 A	08/04/2014	CN 103715365 A	09/04/2014
		US 2014-0091288 A1	03/04/2014
KR 10-2007-0069580 A	03/07/2007	KR 10-1059459 B1	25/08/2011
KR 10-2007-0101711 A	17/10/2007	KR 10-0777086 B1	19/11/2007
US 2012-0038267 A1	16/02/2012	CN 102376746 A	14/03/2012
		CN 102376746 B	03/08/2016
		JP 05459142 B2	02/04/2014
		JP 2012-038677 A	23/02/2012
		KR 10-1823962 B1	31/01/2018
		KR 10-2012-0022609 A	12/03/2012
		TW 2012-12223 A	16/03/2012
		US 8933623 B2	13/01/2015

Form PCT/ISA/210 (patent family annex) (January 2015)

专利名称(译)	OLED桌面和有机发光显示装置用保护膜		
公开(公告)号	EP3573122A1	公开(公告)日	2019-11-27
申请号	EP2018741015	申请日	2018-01-18
[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
当前申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
[标]发明人	CHOI YOUNG SEO KIM MIN JU KIM SANG SHIN KIM JIN HYUK PARK YOUNG DON BAEK YOUNG BIN LEE SANG WOO		
发明人	CHOI, YOUNG SEO KIM, MIN JU KIM, SANG SHIN KIM, JIN HYUK PARK, YOUNG DON BAEK, YOUNG BIN LEE, SANG WOO		
IPC分类号	H01L51/52 H01L51/00 H01L51/56 B32B7/12 B32B27/36 C09J133/00		
CPC分类号	B32B7/12 B32B27/36 C09J133/00 H01L51/00 H01L51/52 H01L51/56 B32B2307/21 B32B2457/206 H01L51/003 H01L51/5253 H01L2227/326 H01L2251/5392 H01L2251/558 B32B7/06 B32B27/08 B32B37/02 B32B37/12 B32B37/182 B32B38/10 B32B2250/02 B32B2250/244 B32B2255/10 B32B2255/26 B32B2367/00 B32B2405/00 C09J9/00 C09J11/06 C09J133/08 H01L51/004		
优先权	1020170008526 2017-01-18 KR		
外部链接	Espacenet		

摘要(译)

提供了一种用于OLED面板的底部保护膜，更具体地，提供了一种用于OLED面板的底部保护膜，其具有优异的取向处理可加工性和对OLED面板的优异粘附性，并且能够通过抗静电处理来防止静电。包括OLED面板的底部保护膜的有机发光显示装置；以及防止电气短路的有机发光显示装置。

FIG. 1