



(11) **EP 1 511 081 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
03.03.2010 Bulletin 2010/09

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

(43) Date of publication A2:
02.03.2005 Bulletin 2005/09

(21) Application number: **04019744.4**

(22) Date of filing: **19.08.2004**

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

- **Anzai, Aya**
Atsugi-shi
Kanagawa-ken 243-0036 (JP)
- **Sakakura, Masayuki**
Atsugi-shi
Kanagawa-ken 243-0036 (JP)
- **Nagai, Masaharu**
Atsugi-shi
Kanagawa-ken 243-0036 (JP)
- **Matsuda, Yutaka**
Atsugi-shi
Kanagawa-ken 243-0036 (JP)

(30) Priority: **29.08.2003 JP 2003347601**
12.09.2003 JP 2003322334

(71) Applicant: **SEMICONDUCTOR ENERGY LABORATORY CO., LTD.**
Atsugi-shi, Kanagawa-ken 243-0036 (JP)

(72) Inventors:
• **Tsuchiya, Kaoru**
Atsugi-shi
Kanagawa-ken 243-0036 (JP)

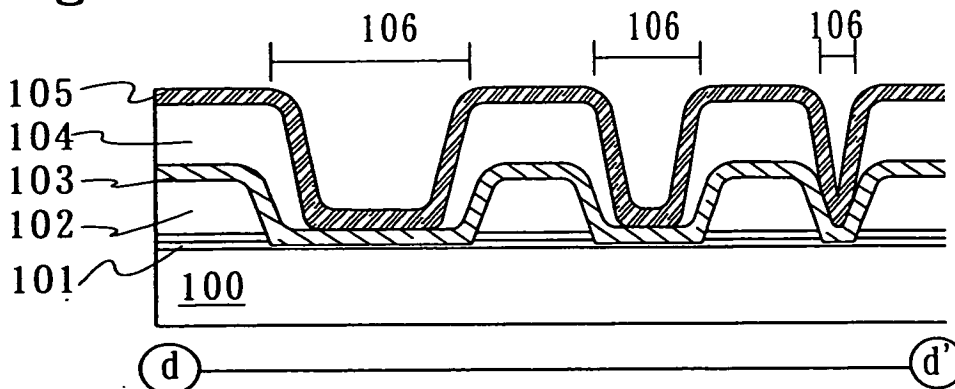
(74) Representative: **Grünecker, Kinkeldey, Stockmair & Schwanhäusser**
Anwaltssozietät
Leopoldstrasse 4
80802 München (DE)

(54) **Display device and method for manufacturing the same**

(57) An object of the present invention is to provide such a sealing structure that a material to be a deterioration factor such as water or oxygen is prevented from entering from external and sufficient reliability is obtained in a display using an organic or inorganic electrolumines-

cent element. In view of the above object, focusing on permeability of an interlayer insulating film, deterioration of an electroluminescent element is suppressed and sufficient reliability is obtained by preventing water entry from an interlayer insulating film according to the present invention.

Fig. 1A



EP 1 511 081 A3

Fig. 1B

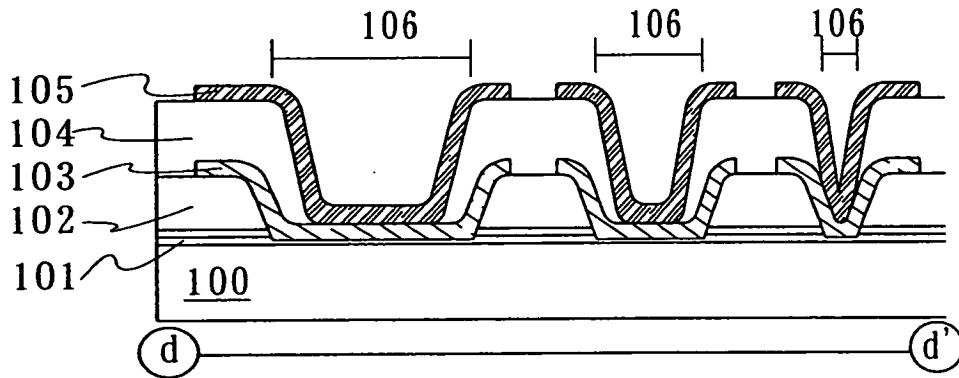
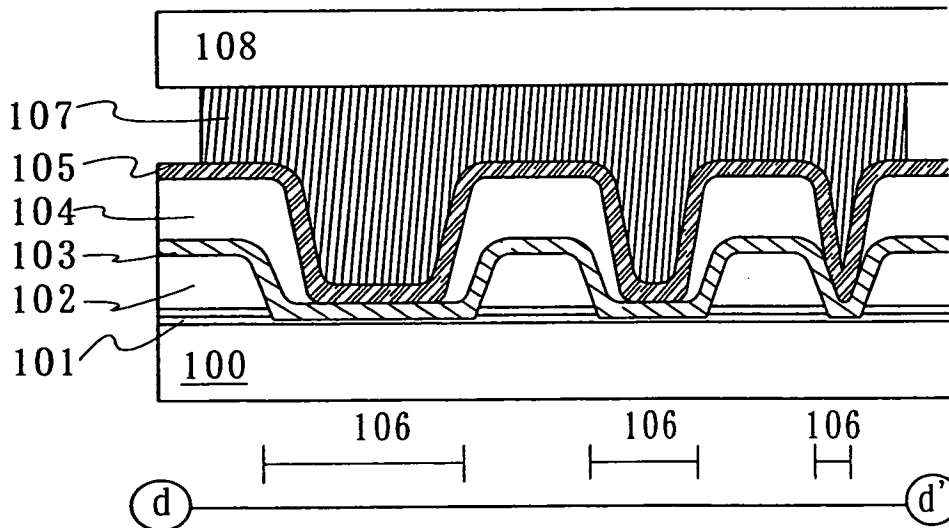


Fig. 1C





EUROPEAN SEARCH REPORT

Application Number
EP 04 01 9744

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|--|---|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
| X | US 2003/089991 A1 (YAMAZAKI SHUNPEI [JP] ET AL) 15 May 2003 (2003-05-15) * paragraphs [0122] - [0140]; figures 1,7a-c * | 1-3,6,9,11-16,18-21,23,26,29,31-41,43,46,49,51-59,120-128 | INV. H01L27/32 H01L51/52 |
| A | US 2003/127651 A1 (MURAKAMI SATOSHI [JP] ET AL) 10 July 2003 (2003-07-10) * paragraphs [0154] - [0165]; figure 9b * | 1-59,120-137 | |
| A | EP 1 058 314 A (SEMICONDUCTOR ENERGY LAB [JP]) 6 December 2000 (2000-12-06) * paragraphs [0099] - [0181]; figures 17b,18a-c * | 1-59,120-137 | |
| ----- | | | TECHNICAL FIELDS SEARCHED (IPC) |
| ----- | | | H01L H05B |
| The present search report has been drawn up for all claims | | | |
| Place of search The Hague | | Date of completion of the search 6 November 2009 | Examiner Bakos, Tamás |
| CATEGORY OF CITED DOCUMENTS | | T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document | |
| X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document | | | |

2
EPO FORM 1503 03.02 (P04C01)



Application Number

EP 04 01 9744

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
1-59, 120-137
- The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 04 01 9744

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-59,120-137

Light-emitting device having two interlayer insulating films provided with openings, and a protective layer covering the openings and at least one of the interlayer insulating films.

2. claims: 60-100,112-119

Light-emitting device with an interlayer insulating film having a tapered portion at the edge of the substrate.

3. claims: 101-111

Light-emitting device having wirings with an interlayer insulating film interposed therebetween, the wirings including bends covered by a sealing material and connecting the device to an external connection.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 01 9744

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-11-2009

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|-------------------------|------------------|
| US 2003089991 A1 | 15-05-2003 | CN 1429055 A | 09-07-2003 |
| | | US 2006006424 A1 | 12-01-2006 |
| | | US 2009256467 A1 | 15-10-2009 |
| ----- | | | |
| US 2003127651 A1 | 10-07-2003 | JP 4101511 B2 | 18-06-2008 |
| | | JP 2003197367 A | 11-07-2003 |
| | | US 2006151789 A1 | 13-07-2006 |
| ----- | | | |
| EP 1058314 A | 06-12-2000 | CN 1284694 A | 21-02-2001 |
| | | CN 1661651 A | 31-08-2005 |
| | | CN 1825620 A | 30-08-2006 |
| | | CN 1825565 A | 30-08-2006 |
| | | KR 20010039644 A | 15-05-2001 |
| | | KR 20050062506 A | 23-06-2005 |
| | | KR 20050075316 A | 20-07-2005 |
| | | KR 20050062507 A | 23-06-2005 |
| | | TW 447145 B | 21-07-2001 |
| | | US 7288420 B1 | 30-10-2007 |
| ----- | | | |

| | | | |
|----------------|--|---------|------------|
| 专利名称(译) | 显示装置及其制造方法 | | |
| 公开(公告)号 | EP1511081A3 | 公开(公告)日 | 2010-03-03 |
| 申请号 | EP2004019744 | 申请日 | 2004-08-19 |
| [标]申请(专利权)人(译) | 株式会社半导体能源研究所 | | |
| 申请(专利权)人(译) | 半导体能源研究所有限公司. | | |
| 当前申请(专利权)人(译) | 半导体能源研究所有限公司. | | |
| [标]发明人 | TSUCHIYA KAORU ANZAI AYA SAKAKURA MASAYUKI NAGAI MASAHARU MATSUDA YUTAKA | | |
| 发明人 | TSUCHIYA, KAORU ANZAI, AYA SAKAKURA, MASAYUKI NAGAI, MASAHARU MATSUDA, YUTAKA | | |
| IPC分类号 | H01L27/32 H01L51/52 H05B33/04 | | |
| CPC分类号 | H01L27/3244 H01L27/3276 H01L51/5246 H01L2251/5323 H01L2924/0002 H01L2924/00 H01L21/02107 H01L27/3246 H01L51/0053 H01L2924/0635 H01L33/52 | | |
| 优先权 | 2003347601 2003-08-29 JP 2003322334 2003-09-12 JP | | |
| 其他公开文献 | EP1511081B1 EP1511081A2 | | |
| 外部链接 | Espacenet | | |

摘要(译)

本发明的一个目的是提供这样一种密封结构，即防止诸如水或氧的劣化因素的材料从外部进入，并且在使用有机或无机电致发光元件的显示器中获得足够的可靠性。鉴于上述目的，着眼于层间绝缘膜的渗透性，通过防止水从根据本发明的层间绝缘膜进入，抑制了电致发光元件的劣化并获得了足够的可靠性。

Fig. 1A

