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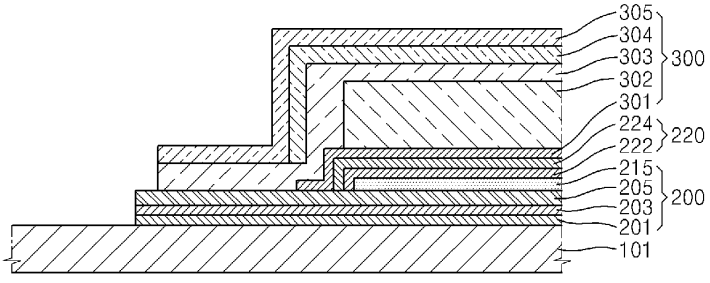
(54) Organic light-emitting display system and method of manufacturing the same

(57) An organic light-emitting display system and a method of manufacturing the same are disclosed. In one aspect, the organic light-emitting display system includes a substrate (101), a display unit (200) that defines an active area (AA) on the substrate (101) and includes a plurality of thin film transistor (TFTs), and an encapsulation layer (300) that seals the display unit (200) and has a stacked structure in which at least a first inorganic film (301), a first organic film (302), and a second inorganic film (303) are sequentially stacked. The TFTs includes an active layer (202), a gate electrode (204), a source electrode (206), a drain electrode (207), and an interlayer insulating film (205) that is disposed between the gate electrode (204) and the source electrode (206) and between the gate electrode (204) and the drain electrode (207), wherein the second inorganic film (303) directly contacts the interlayer insulating film (205) outside the active area (AA). Accordingly, in various embodiments, since an inorganic layer of a thin film encapsulation layer is prevented from being cracked, penetration of external moisture or oxygen into the active area of the display can be reduced or prevented.

FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 13 17 7515

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 Y	US 2008/079360 A1 (KUBOTA TAKEHIKO [JP]) 3 April 2008 (2008-04-03) * paragraphs [0040] - [0055]; figure 3 *	1,2,12 3-5	INV. H01L51/52 H01L51/56 H01L27/32
Y	US 2010/200846 A1 (KWACK JIN-HO [KR] ET AL) 12 August 2010 (2010-08-12) * paragraphs [0005] - [0008], [0040] - [0046], [0056] - [0058], [0069] - [0071]; figures 2,6,10 *	1-15	
Y	US 2012/091477 A1 (KIM TAE-JIN [KR]) 19 April 2012 (2012-04-19) * paragraphs [0006], [0007], [0034] - [0051]; figure 2 *	1-15	
Y	US 2012/146492 A1 (RYU JI-HUN [KR] ET AL) 14 June 2012 (2012-06-14) * paragraphs [0011], [0056] - [0059], [0065] - [0075]; figures 2, 6-11 *	2	
Y	US 2007/281174 A1 (MORO LORENZA [US] ET AL) 6 December 2007 (2007-12-06) * paragraphs [0005] - [0015], [0051] - [0059], [0079] - [0089], [0105] *	6-9,14	TECHNICAL FIELDS SEARCHED (IPC) H01L
Y	US 2011/100458 A1 (KANG JAE-WOOK [KR] ET AL) 5 May 2011 (2011-05-05) * paragraphs [0024] - [0030], [0046] - [0050] *	5,9	
Y	US 2008/238301 A1 (SHIM HONG-SHIK [KR] ET AL) 2 October 2008 (2008-10-02) * paragraphs [0057] - [0059]; figure 3 *	15	
A	US 2011/151200 A1 (ERLAT AHMET GUN [US] ET AL) 23 June 2011 (2011-06-23) * paragraphs [0003], [0004], [0007], [0010], [0023] - [0026], [0033] - [0043]; figures 3,8 *	1,2	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 August 2014	Boetticher, Harald

CATEGORY OF CITED DOCUMENTS

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

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

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 13 17 7515

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:

☐ 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).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 13 17 7515

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, 2

   A display with TFTs has as encapsulation an organic film between two inorganic films, the upper inorganic film having the largest coverage area, and the organic film having the smallest coverage area

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2. claims: 3-5, 12

   The TFTs comprise an interlayer insulating film contacted by the upper inorganic film, at least one of these films being silicon nitride

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3. claims: 6-8, 13

   Each OLED of the display comprises a counter electrode with a protective layer thereon

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4. claims: 9, 14

   The first inorganic film is AlOx

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5. claims: 10, 11, 15

   A further organic film and an inorganic film are formed on the upper inorganic film

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 17 7515

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.

01-08-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008079360 A1	03-04-2008	CN 101160001 A	09-04-2008
		JP 4245032 B2	25-03-2009
		JP 2008091237 A	17-04-2008
		KR 20080031115 A	08-04-2008
		TW 200824489 A	01-06-2008
		US 2008079360 A1	03-04-2008
US 2010200846 A1	12-08-2010	KR 20100090888 A	18-08-2010
		US 2010200846 A1	12-08-2010
US 2012091477 A1	19-04-2012	KR 20120040480 A	27-04-2012
		US 2012091477 A1	19-04-2012
US 2012146492 A1	14-06-2012	KR 20120065049 A	20-06-2012
		US 2012146492 A1	14-06-2012
US 2007281174 A1	06-12-2007	EP 2173920 A2	14-04-2010
		JP 2010533087 A	21-10-2010
		KR 20100051810 A	18-05-2010
		TW 200913345 A	16-03-2009
		US 2007281174 A1	06-12-2007
		WO 2009009306 A2	15-01-2009
US 2011100458 A1	05-05-2011	KR 20110049477 A	12-05-2011
		US 2011100458 A1	05-05-2011
US 2008238301 A1	02-10-2008	KR 20080088991 A	06-10-2008
		US 2008238301 A1	02-10-2008
US 2011151200 A1	23-06-2011	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

专利名称(译)	有机发光显示系统及其制造方法		
公开(公告)号	EP2733763A3	公开(公告)日	2014-09-17
申请号	EP2013177515	申请日	2013-07-23
[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	LEE JEONG YEOL CHO YOON HYEUNG HAN OUCK		
发明人	LEE, JEONG-YEOL CHO, YOON-HYEUNG HAN, OUCK		
IPC分类号	H01L51/52 H01L51/56 H01L27/32		
CPC分类号	H01L27/3244 H01L51/5246 H01L51/5256 H01L27/00 H05B33/04 H01L27/3272 H01L51/00 H01L51/56		
优先权	1020120131115 2012-11-19 KR		
其他公开文献	EP2733763B1 EP2733763A2		
外部链接	Espacenet		

摘要(译)

公开了一种有机发光显示系统及其制造方法。在一个方面，有机发光显示系统包括基板（101），在基板（101）上限定有源区（AA）的显示单元（200），并包括多个薄膜晶体管（TFT），密封层（300），其密封显示单元（200）并具有堆叠结构，其中至少第一无机膜（301），第一有机膜（302）和第二无机膜（303）是顺序的堆叠。 TFT包括有源层（202），栅电极（204），源电极（206），漏电极（207），以及设置在栅电极（204）和之间的层间绝缘膜（205）。源电极（206）和栅电极（204）与漏电极（207）之间，其中第二无机膜（303）直接接触有源区（AA）外的层间绝缘膜（205）。因此，在各种实施例中，由于防止薄膜封装层的无机层破裂，因此可以减少或防止外部湿气或氧气渗透到显示器的有效区域中。

FIG. 4