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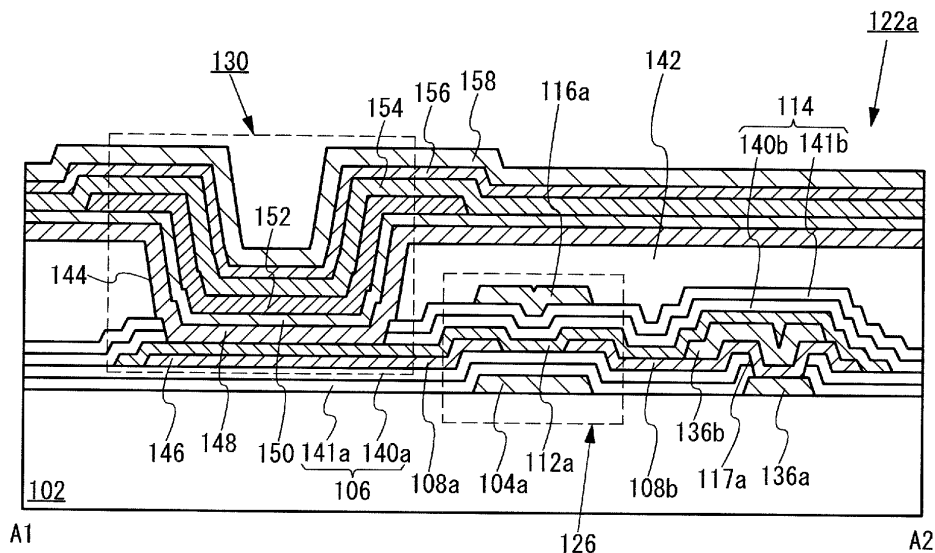
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(54) **DISPLAY DEVICE**

(57) A display device includes a transistor includes an oxide semiconductor layer (112a), a first gate electrode (104a), a first insulating layer (106), and a transparent conductive layer (108a), and an organic EL element (130) includes a first electrode (146) being light-transmissive, and a second electrode (158), a light emitting layer (152), and an electron transfer layer (144). The first gate electrode including a region overlapping the oxide semiconductor layer, the first insulating layer provided between the first gate electrode and the oxide semiconductor layer, the transparent conductive layer

provided between the first insulating layer and the oxide semiconductor layer, and at least including a region in contact with the oxide semiconductor layer, the first electrode including a region overlapping the second electrode, the light emitting layer and the electron transfer layer provided between the first electrode and the second electrode, the electron transfer layer provided between the first electrode and the light emitting layer, and the first electrode is continuous from the transparent conductive layer.

FIG. 9A





EUROPEAN SEARCH REPORT

Application Number
EP 18 17 3345

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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 2012/248451 A1 (SONE YUJI [JP] ET AL) 4 October 2012 (2012-10-04)	1,2,4	INV. H01L27/32 H01L51/52
Y	* paragraph [0206] - paragraph [0207]; figure 16 * * paragraph [0216] - paragraph [0217] * * paragraph [0108] * * paragraph [0132] *	3,5-7	
Y	----- US 2010/244020 A1 (SAKATA JUNICHIRO [JP] ET AL) 30 September 2010 (2010-09-30) * paragraph [0255]; figures 31A, 32A * * paragraph [0251] * -----	3,5-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01L
1 The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 September 2018	Examiner Beierlein, Udo
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			

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Application Number

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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:

1-7

☐ 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 18 17 3345

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: 1-7

a dual gate transistor

2. claims: 1, 8-20

an electron transfer layer or an electron injection layer in
an OLED

3. claims: 1, 21, 22

a reflective layer in an OLED

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

EP 18 17 3345

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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
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24-09-2018

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012248451 A1	04-10-2012	CN 102782858 A	14-11-2012
		CN 105097952 A	25-11-2015
		EP 2517255 A1	31-10-2012
		KR 20120085923 A	01-08-2012
		TW 201131772 A	16-09-2011
		TW 201431066 A	01-08-2014
		US 2012248451 A1	04-10-2012
		US 2018331196 A1	15-11-2018
		WO 2011078398 A1	30-06-2011

US 2010244020 A1	30-09-2010	CN 101847661 A	29-09-2010
		JP 5539764 B2	02-07-2014
		JP 2010251731 A	04-11-2010
		KR 20100108245 A	06-10-2010
		TW 201044585 A	16-12-2010
		US 2010244020 A1	30-09-2010

专利名称(译)	显示设备		
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发明人	TANAKA, SAKAE		
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优先权	2017107278 2017-05-31 JP		
其他公开文献	EP3410490A2		
外部链接	Espacenet		

摘要(译)

一种显示装置，包括：晶体管，包括氧化物半导体层（112a），第一栅电极（104a），第一绝缘层（106）和透明导电层（108a）；以及有机EL元件（130），包括：第一电极（146）是透光的，第二电极（158），发光层（152）和电子传输层（144）。第一栅电极包括与氧化物半导体层重叠的区域，第一绝缘层设置在第一栅电极和氧化物半导体层之间，透明导电层设置在第一绝缘层和氧化物半导体层之间，并且至少包括与氧化物半导体层接触的区域，第一电极包括与第二电极重叠的区域，发光层和设置在第一电极和第二电极之间的电子传输层，电子传输层设置在第一电极和第二电极之间发光层，第一电极与透明导电层连续。

