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**19.08.2014 US 201462038925 P**  
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**24.11.2014 US 201462083490 P**  
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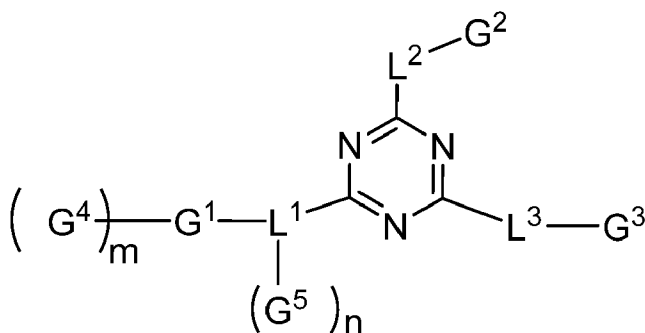
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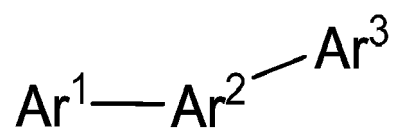
(54) **ORGANIC ELECTROLUMINESCENT MATERIALS AND DEVICES**

(57) A composition comprising a first compound and a second compound is described. The composition can be a mixture of a first compound having a structure according to Formula I,

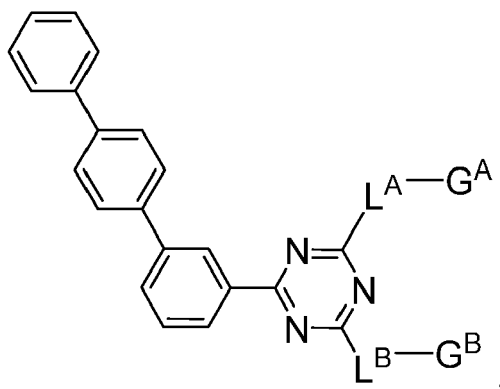


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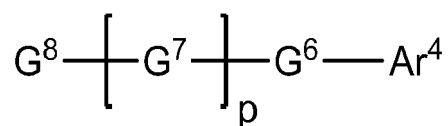
and a second compound having a structure according to Formula II,



The composition can also be a mixture of a first compound having a structure according to Formula III,



and a second compound having a structure according to Formula IV,



Devices, such as OLEDs, that include the compositions for Formulas I & II or Formulas III & IV, as well as, methods of making the same are also described.

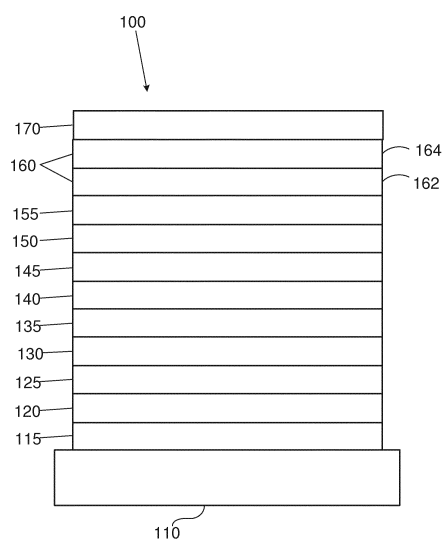


FIGURE 1



## EUROPEAN SEARCH REPORT

 Application Number  
 EP 15 17 5686

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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	WO 2013/032297 A1 (ROHM & HAAS ELECT MATERIALS [KR]; LEE HYO-JUNG [KR]; KIM HYE-MI [KR];) 7 March 2013 (2013-03-07) * paragraphs [0085] - [0086]; compounds B-56, B-57 *	1-13,15	INV. H01L51/54
X	WO 2013/077362 A1 (IDEMITSU KOSAN CO [JP]; MIZUTANI SAYAKA [JP]; SADO TAKAYASU [JP]) 30 May 2013 (2013-05-30) * pages 29-47 *	1-13,15	
X,P	-& US 2014/312338 A1 (MIZUTANI SAYAKA [JP] ET AL) 23 October 2014 (2014-10-23) * pages 37,112, paragraphs 181,357 *	1-13,15	
X	US 2012/126208 A1 (KAWAMURA YUICHIRO [JP] ET AL) 24 May 2012 (2012-05-24) * paragraph [0030]; compounds TB-14,TB-15 - TB-17,TB-19 *	1-13,15	
X	JP 2014 125449 A (TOSOH CORP) 7 July 2014 (2014-07-07) * compounds D-5 *	14,15	TECHNICAL FIELDS SEARCHED (IPC)
X	JP 2004 022334 A (KONICA MINOLTA HOLDINGS INC) 22 January 2004 (2004-01-22) * compounds 2-6 *	14,15	H01L
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 January 2016	Examiner Wolfbauer, Georg
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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 EPO FORM 1503 03.02 (P04C01)



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**CLAIMS INCURRING FEES**

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

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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):

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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.

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**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:

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see sheet B

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All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

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As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

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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:

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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:

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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 15 17 5686

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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:

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1. claims: 1-13(completely); 15(partially)

A composition comprising a compound having a triazine moiety and one substituent selected from dibenzofuran, dibenzothiophene, dibenzoselenophene and fluorene.

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2. claims: 14(completely); 15(partially)

A composition comprising a compound having a triazine moiety and one terphenyl substituent.

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

EP 15 17 5686

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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  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-01-2016

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013032297 A1	07-03-2013	CN 103889975 A	25-06-2014
		JP 2014531420 A	27-11-2014
		KR 20130025190 A	11-03-2013
		TW 201326159 A	01-07-2013
		WO 2013032297 A1	07-03-2013
-----			
WO 2013077362 A1	30-05-2013	JP WO2013077362 A1	27-04-2015
		KR 20140095491 A	01-08-2014
		TW 201329202 A	16-07-2013
		US 2014312338 A1	23-10-2014
		WO 2013077362 A1	30-05-2013
-----			
US 2014312338 A1	23-10-2014	JP WO2013077362 A1	27-04-2015
		KR 20140095491 A	01-08-2014
		TW 201329202 A	16-07-2013
		US 2014312338 A1	23-10-2014
		WO 2013077362 A1	30-05-2013
-----			
US 2012126208 A1	24-05-2012	NONE	
-----			
JP 2014125449 A	07-07-2014	NONE	
-----			
JP 2004022334 A	22-01-2004	JP 4106974 B2	25-06-2008
		JP 2004022334 A	22-01-2004
-----			

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)	有机电致发光材料和器件		
公开(公告)号	<a href="#">EP2966706A3</a>	公开(公告)日	2016-03-02
申请号	EP2015175686	申请日	2015-07-07
[标]申请(专利权)人(译)	环球展览公司		
申请(专利权)人(译)	通用显示器公司		
当前申请(专利权)人(译)	通用显示器公司		
[标]发明人	ZENG LICHANG LAYEK SUMAN BOUDREAULT PIERRE LUC T ELSHENAWY ZEINAB KOTTAS GREGG DYATKIN ALEXEY BORISOVICH JOSEPH SCOTT ADAMOVICH VADIM XIA CHUANJUN WANG TING CHIH YEAGER WALTER		
发明人	ZENG, LICHANG LAYEK, SUMAN BOUDREAULT, PIERRE-LUC T. ELSHENAWY, ZEINAB KOTTAS, GREGG DYATKIN, ALEXEY BORISOVICH JOSEPH, SCOTT ADAMOVICH, VADIM XIA, CHUANJUN WANG, TING-CHIH YEAGER, WALTER		
IPC分类号	H01L51/54		
CPC分类号	C07D251/24 C07D405/10 C07D409/04 C07D409/10 C07D421/10 H01L51/0052 H01L51/0067 H01L51/0071 H01L51/0073 H01L51/0074 C09K11/025 C09K11/06 C09K2211/1007 C09K2211/1059 C09K2211/1092 C09K2211/1096 C09K2211/185 H01L51/0085 H01L51/5016 H01L51/0058 H01L51/5072		
代理机构(译)	汉森NORBERT		
优先权	62/022300 2014-07-09 US 62/038925 2014-08-19 US 62/060192 2014-10-06 US 62/083490 2014-11-24 US 14/734712 2015-06-09 US		
其他公开文献	EP2966706A2 EP2966706B1		
外部链接	<a href="#">Espacenet</a>		
摘要(译)			

描述了包含第一化合物和第二化合物的组合物。该组合物可以是具有根据式I的结构的第一化合物和具有根据式II的结构第二化合物的混合物。该组合物还可以是具有根据式III的结构的第一化合物的混合物，和还描述了具有根据式IV的结构第二化合物，包括用于式I和II或式III和IV的组合物的装置，例如OLED，以及制备它们的方法。

