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PT RO SE SI SK SM TR**

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**09792929.3 / 2 329 540**

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(54) **ORGANOSELENIUM MATERIALS AND THEIR USES IN ORGANIC LIGHT EMITTING DEVICES**

(57) The present invention provides organoselenium compounds comprising dibenzoselenophene, benzo[b]selenophene or benzo[c]selenophene and their uses in organic light emitting devices.

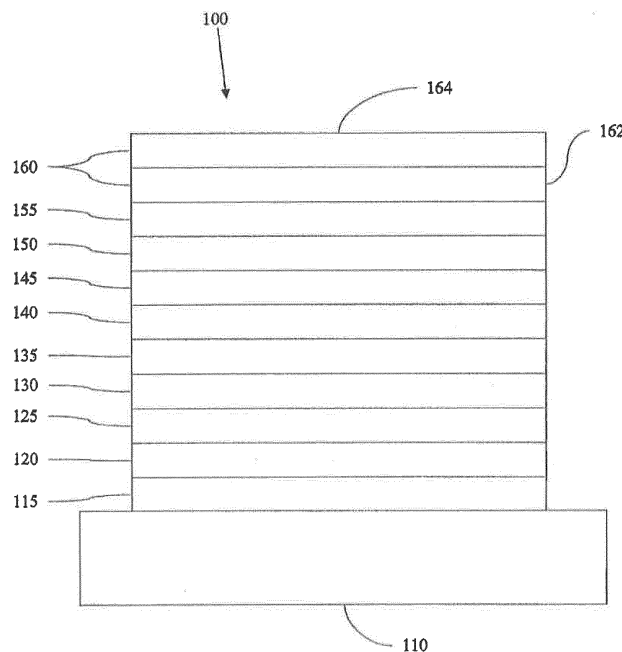


Figure 1

**EP 3 185 333 A3**



EUROPEAN SEARCH REPORT

Application Number  
EP 17 15 0393

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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 2008/100207 A1 (PARK SANG-HOON [KR] ET AL) 1 May 2008 (2008-05-01) * paragraphs [0077], [0080], [0081], [0093]; claim 7; figure 1 *	1,5-12	INV. H01L51/54
X	JP 2000 252065 A (SUMITOMO CHEMICAL CO) 14 September 2000 (2000-09-14) * claim 1 *	1	
X	GAIDIS, J.M.: "Biphenylene Insertion Products, Dibenzoselenophene and Diphenyldibenzostannole", J.ORG.CHEM., vol. 35, no. 8, 1970, pages 2811-2813, XP002560305, * figures compound,II *	13	
X	SATO, S. AND FURUKAWA, N.: "First Detection of 2,2'-Biphenylylenediphenylsulfurane and -Selenurane [10-M-4(C4), M=S,Se] by Low Temperature NMR Experiments and Isolation of the Tellurane", TETRAHEDRON LETTERS, vol. 36, no. 16, 1995, pages 2803-2806, XP002560306, * figures compound,9,scheme,1 *	13	
----- -/--			TECHNICAL FIELDS SEARCHED (IPC)
			H01L
<del>The present search report has been drawn up for all claims</del>			
Place of search		Date of completion of the search	Examiner
The Hague		8 May 2017	Fratiloiu, Silvia
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)



EUROPEAN SEARCH REPORT

Application Number  
EP 17 15 0393

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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	SUZUKI, H. AND NAKAMURA, T.: "A Convenient Synthesis of Functionalized Dibenzotellurophenes and Related Compounds via the Intramolecular Telluro Coupling Reaction. The positive Effect of Heavy Chalcogen Atoms on the Molecular Hyperpolarizability of a Captodative Conjugation System", J. ORG. CHEM., vol. 60, 1995, pages 5274-5278, XP002560307, * figures compound,4a,chart,1 *	13	
X	KIMURA, T., ISHIKAWA, Y., UEKI, K., HORIE, Y., FURUKAWA, N.: "Effect of Through-Space Interaction on the Photolytic Desulfurization or Deselenization and Intramolecular Cyclization Reactions of 1,9-Disubstituted Dibenzochalcogenophenes", J. ORG. CHEM., vol. 59, 1994, pages 7117-7124, XP002560308, * figures Scheme,1 *	13	
<del>The present search report has been drawn up for all claims</del>			TECHNICAL FIELDS SEARCHED (IPC)
Place of search The Hague		Date of completion of the search 8 May 2017	Examiner Fratiloiu, Silvia
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 03.02 (P04C01)



Application Number

EP 17 15 0393

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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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1, 5-13(all partially)

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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).



**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 17 15 0393

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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, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (1) and (2)

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2. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (3), (7) and (10).

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3. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (4), (5), (6), (8), (9) and (11)

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4. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (12) and (14)

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5. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (13) and (15)

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6. claims: 1, 3-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (16)

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7. claims: 1, 3, 5-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (17)

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8. claims: 1, 5-13(all partially)

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**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 17 15 0393

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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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the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (18) and (19)

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9. claims: 1, 3, 5-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (20)

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10. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (21)

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11. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (22), (24), (25), (26), (27) and (28)

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12. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (23)

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13. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (29)

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14. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (30), (31), (32), (33), (34) and (35)

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15. claims: 1, 3, 5-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which

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**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 17 15 0393

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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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is denoted compound (36)

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16. claims: 1, 3, 5-14(all partially)

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the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (37)

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17. claims: 1, 5-13(all partially)

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the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (38)

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18. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (39)

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19. claims: 1, 3, 5-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (40)

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20. claims: 1, 3, 5-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (41) and (49)

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21. claims: 1, 3, 5-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (42)

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22. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (43)

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**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 17 15 0393

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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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23. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (44) and (45)

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24. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (46)

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25. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (47)

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26. claims: 1, 5-13(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (48)

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27. claims: 2, 4-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (50), (51) and (52)

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28. claims: 2, 4-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (54)

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29. claims: 2, 4-14(all partially)

the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (55)

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30. claims: 2, 5-13(all partially)

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**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 17 15 0393

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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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the organic emitting device comprising an organoselenium compound or the organoselenium compound, respectively, which is denoted compound (56)

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

EP 17 15 0393

5 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.

08-05-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008100207 A1	01-05-2008	KR 20080039057 A US 2008100207 A1	07-05-2008 01-05-2008
JP 2000252065 A	14-09-2000	JP 3772576 B2 JP 2000252065 A	10-05-2006 14-09-2000

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)	有机硒材料及其在有机发光器件中的用途		
公开(公告)号	<a href="#">EP3185333A3</a>	公开(公告)日	2017-10-04
申请号	EP2017150393	申请日	2009-09-24
[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	XIA CHUANJUN KWONG RAYMOND MA BIN LIN CHUN		
发明人	XIA, CHUANJUN KWONG, RAYMOND MA, BIN LIN, CHUN		
IPC分类号	H01L51/54		
CPC分类号	C07D345/00 C07D421/14 H01L51/0061 H01L51/0071 H01L51/5012 Y10S428/917 C09K11/06 H01L51/0067 H01L51/0072 H01L51/5024 C07F5/027 H01L51/0069 H01L51/0085 H01L51/0087 H01L51/0088 H01L51/5016 H01L51/506 H01L51/5076		
代理机构(译)	MAIWALD专利ADVOCATE GMBH		
优先权	61/100229 2008-09-25 US		
其他公开文献	EP3185333A2		
外部链接	<a href="#">Espacenet</a>		

摘要(译)

本发明提供了包含二苯并硒吩，苯并[b]硒吩或苯并[c]硒吩的有机硒化合物及其在有机发光器件中的用途。

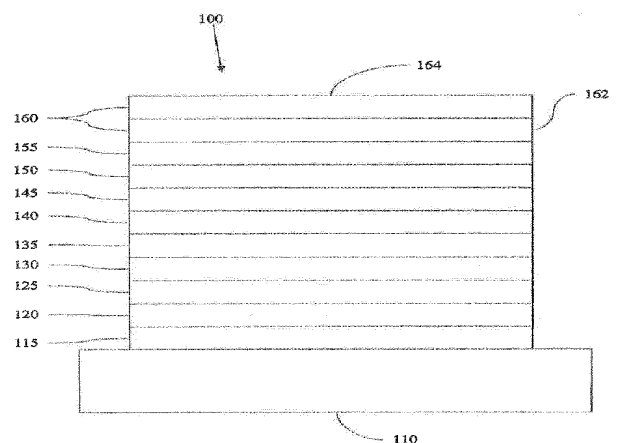


Figure 1