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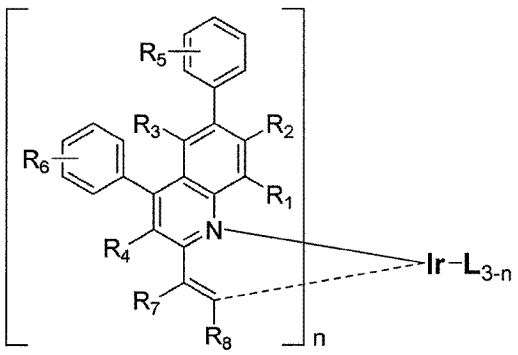
(54) **Novel red electroluminescent compounds and organic electroluminescent device using the same**

(57) The present invention relates to novel organic electroluminescent compounds exhibiting high luminous efficiency, and organic electroluminescent devices comprising the same. The organic electroluminescent compounds according to the invention are represented by Chemical Formula (1):

Chemical Formula 1



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EUROPEAN SEARCH REPORT

Application Number
EP 08 16 9471

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	PARK, GUI YOUN ET AL: "Synthesis and photo physical study of iridium complex of new pentafluorophenyl-substituted ligands" THIN SOLID FILMS, CODEN: THSFAP; ISSN: 0040-6090, vol. 516, no. 11, 2008, pages 3622-3626, XP002514162 * the whole document *	1-8	INV. C09K11/06 H05B33/14 C07D215/58 C07F15/00 H01L51/50 H01L51/00
X	US 2005/227109 A1 (CHENG CHIEN-HONG [TW] ET AL CHENG CHIEN-HONG [TW] ET AL) 13 October 2005 (2005-10-13) * page 1, paragraphs [0004]-[0012], examples, claims *	1-8	
X	WO 03/033617 A (UNIVERSAL DISPLAY CORP [US]; UNIV SOUTHERN CALIFORNIA [US]; KWONG RAYM) 24 April 2003 (2003-04-24) * page 3, Formula I, page 3, line 15 through page 5, line 5, examples, claims *	1-8	
X	US 2005/025995 A1 (CHENG CHIEN-HONG [TW] ET AL) 3 February 2005 (2005-02-03) * page 5, paragraph [0085] through page 6, paragrpah [0090], examples, claims *	1-8	TECHNICAL FIELDS SEARCHED (IPC) C09K H05B C07D C07F
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 June 2009	Nemes, Csaba A.

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
EP 08 16 9471

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	PARK, YONG HWAN ET AL: "Heteroleptic tris-cyclometalated iridium(III) complexes with phenylpridine and diphenylquinoline derivative ligands" THIN SOLID FILMS , 515(12), 5084-5089 CODEN: THSFAP; ISSN: 0040-6090 THIN SOLID FILMS , 515(12), 5084-5089 CODEN: THSFAP; ISSN: 0040-6090, 2007, XP002530279 * the whole document *	1-9	
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A	ZHANG, XIAOWEI ET AL: "Highly efficient iridium(III) complexes with diphenylquinoline ligands for organic light-emitting diodes: Synthesis and effect of fluorinated substitutes on electrochemistry, photophysics and electroluminescence" JOURNAL OF ORGANOMETALLIC CHEMISTRY , 691(20), 4312-4319 CODEN: JORCAI; ISSN: 0022-328X, 2006, XP002530281 * the whole document *	1-9	TECHNICAL FIELDS SEARCHED (IPC)

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 June 2009	Nemes, Csaba A.

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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)
A	CHEN, LIANQING ET AL: "Tuning the saturated red emission: synthesis, electrochemistry and photophysics of 2-arylquinoline based iridium(III) complexes and Tuning the saturated red emission: synthesis, electrochemistry and photophysics of 2-arylquinoline based iridium(III) complexes and their application in OLEDs" JOURNAL OF MATERIALS CHEMISTRY , 16(32), 3332-3339 CODEN: JMACEP; ISSN: 0959-9428, 2006, XP002530282 * the whole document *	1-9	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 June 2009	Nemes, Csaba A.

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Y : particularly relevant if combined with another document of the same category
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Application Number
EP 08 16 9471

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 08 16 9471

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: 1-8(part)

   Organic electroluminescent compound represented by Chemical Formula 2, organic electroluminescent device comprising an electroluminescent region comprising said compound.

   ---

2. claims: 1-8(part)

   Organic electroluminescent compound represented by Chemical Formula 3, organic electroluminescent device comprising an electroluminescent region comprising said compound.

   ---

3. claims: 1-8(part)

   Organic electroluminescent compound represented by Chemical Formula 4, organic electroluminescent device comprising an electroluminescent region comprising said compound.

   ---

4. claims: 1-8(part)

   Organic electroluminescent compound represented by Chemical Formula 5, organic electroluminescent device comprising an electroluminescent region comprising said compound.

   ---

5. claims: 1-8(part)

   Organic electroluminescent compound represented by Chemical Formula 6, organic electroluminescent device comprising an electroluminescent region comprising said compound.

   ---

6. claims: 1-8(part)

   Organic electroluminescent compound represented by Chemical Formula 7, organic electroluminescent device comprising an electroluminescent region comprising said compound.

   ---

7. claim: 9

   Organic solar cell comprising an organic electroluminescent compound represented by Chemical Formula 1.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 16 9471

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.

15-06-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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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)	新型红色电致发光化合物和使用其的有机电致发光器件		
公开(公告)号	EP2062959A3	公开(公告)日	2009-08-05
申请号	EP2008169471	申请日	2008-11-20
申请(专利权)人(译)	GRACEL显示增量.		
当前申请(专利权)人(译)	GRACEL显示增量.		
[标]发明人	KIM JIN HO EUM SUNG JIN CHO YOUNG JUN KWON HYUCK JOO KIM BONG OK KIM SUNG MIN YOON SEUNG SOO		
发明人	KIM, JIN HO EUM, SUNG JIN CHO, YOUNG JUN KWON, HYUCK JOO KIM, BONG OK KIM, SUNG MIN YOON, SEUNG SOO		
IPC分类号	C09K11/06 H05B33/14 C07D215/58 C07F15/00 H01L51/50 H01L51/00		
CPC分类号	C09K11/06 C07F15/0033 C09K2211/185 H01L51/0081 H01L51/0085 H01L51/42 H01L51/5016 H05B33/14 Y02E10/549		
优先权	1020070118281 2007-11-20 KR		
其他公开文献	EP2062959A2		
外部链接	Espacenet		

摘要(译)

本发明涉及具有高发光效率的新型有机电致发光化合物，以及包含该化合物的有机电致发光器件。根据本发明的有机电致发光化合物由化学式（1）表示：

Chemical Formula 1