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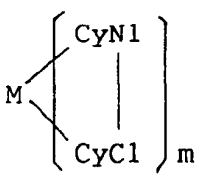
(54) **Metal coordination compound, luminescence device and display apparatus**

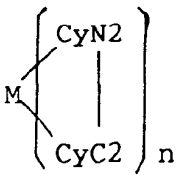
(57) An electroluminescence device having a layer containing a specific metal coordination compound is provided. The metal coordination compound is represented by formula (1) below:

$$ML_mL'_n \quad (1),$$

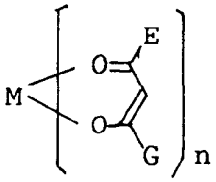
wherein M is a metal atom of Ir, Pt, Rh or Pd; L and L' are mutually different bidentate ligands; m is 1, 2 or 3 and n is 0, 1 or 2 with the proviso that m+n is 2 or 3; a partial structure MLm is represented by formula (2) shown below and a partial structure ML'_n is represented by formula (3) or (4) shown below:



(2)



(3)



(4)

at least one of the optional substituent(s) of the cyclic groups, and the cyclic groups CyC1 and CyC2 include an aromatic group capable of having a substituent represented by the following formula (5):

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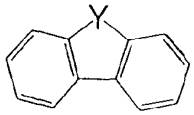

The metal coordination compound having the aromatic group is effective in providing high-efficiency luminescence and long-term high luminance.

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EUROPEAN SEARCH REPORT

Application Number
EP 02 00 5112

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	BALDO M A ET AL: "VERY HIGH-EFFICIENCY GREEN ORGANIC LIGHT-EMITTING DEVICES BASED ON ELECTROPHOSPHORESCENCE" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 75, no. 1, 5 July 1999 (1999-07-05), pages 4-6, XP002949187 ISSN: 0003-6951 * the whole document * ---	1,4, 6-11, 13-16	C07F15/00 H01L51/00
X	DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; DJUROVICH, PETER I. ET AL: "Ir(III) cyclometalated complexes as efficient phosphorescent emitters in polymer blend and organic LEDs" retrieved from STN Database accession no. 132:300666 XP002200768 * abstract * & POLYMER PREPRINTS (AMERICAN CHEMICAL SOCIETY, DIVISION OF POLYMER CHEMISTRY) (2000), 41(1), 770-771, ---	1,4, 6-11, 13-16	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H01L C07F
X	SERGEY LAMANSKY: "Molecularly doped polymer light emitting diodes utilizing phosphorescent Pt(II) and Ir(III) dopants" ORGANIC ELECTRONICS, ELSEVIER, AMSTERDAM, NL, no. 2, 2001, pages 53-62, XP002196402 ISSN: 1566-1199 page 55: Pt(thpy)2; FIr(ppy)3 * the whole document * --- -/--	1,4, 6-11, 13-16	

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
MUNICH	31 May 2002	Richter, H

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 Patent Office

Application Number
EP 02 00 5112

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims 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 the first ten claims.

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:

4, 12, partially: 1,5 - 11, 13 - 16

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EUROPEAN SEARCH REPORT

Application Number
EP 02 00 5112

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
P,X	WO 02 02714 A (E.I. DU PONT DE NEMOURS AND COMPANY, USA) 10 January 2002 (2002-01-10) fourth formula : fac-Ir(La)3 fifth formula mer-Ir(La)3 * page 6, line 1 - page 10, line 19; claims 1-8; example 1; tables 2-4 *	1,4, 6-11, 13-16	
P,X	WO 02 15645 A (THE TRUSTEES OF PRINCETON UNIVERSITY, USA;THE UNIVERSITY OF SOUTHERN C) 21 February 2002 (2002-02-21) * claims 3,5,9,29; figures 7P,8C *	1,4, 6-11, 13-16	
E	EP 1 191 612 A (CANON KABUSHIKI KAISHA, JAPAN) 27 March 2002 (2002-03-27) * the whole document *	1,4, 6-11, 13-16	
E	EP 1 191 613 A (CANON KABUSHIKI KAISHA, JAPAN) 27 March 2002 (2002-03-27) * the whole document *	1,4, 6-10, 13-16	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
E	EP 1 191 614 A (CANON KABUSHIKI KAISHA, JAPAN) 27 March 2002 (2002-03-27) * page 5 - page 23; examples 2,4-8,11-13,16,18-20,23; table 8 *	1,4, 6-10, 13-16	

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
MUNICH	31 May 2002	Richter, H

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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P : intermediate document

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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 02 00 5112

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: 4, 12; partially: 1,5-11,13-16

   complexes of formula (I) in which n is 0

2. Claims: 2, partially: 1, 5-11,13-16

   complexes of formula (I) in which n is not 0 and the partial structure ML'n is represented by formula (3)

3. Claims: 3; partially: 1, 5-11,13-16

   complexes of formula (I) in which n is not 0 and the partial structure ML'n is represented by formula (4)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 5112

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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31-05-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0202714 A	10-01-2002	AU 7155001 A	14-01-2002
		WO 0202714 A2	10-01-2002
WO 0215645 A	21-02-2002	AU 8327401 A	25-02-2002
		WO 0215645 A1	21-02-2002
EP 1191612 A	27-03-2002	EP 1191612 A2	27-03-2002
		US 2002063516 A1	30-05-2002
EP 1191613 A	27-03-2002	EP 1191613 A2	27-03-2002
		US 2002064681 A1	30-05-2002
EP 1191614 A	27-03-2002	JP 2002175884 A	21-06-2002
		EP 1191614 A2	27-03-2002
		US 2002068190 A1	06-06-2002

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)	金属配位化合物，发光装置和显示装置		
公开(公告)号	EP1238981A3	公开(公告)日	2002-10-30
申请号	EP2002005112	申请日	2002-03-07
[标]申请(专利权)人(译)	佳能株式会社		
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[标]发明人	TAKIGUCHI TAKAO OKADA SHINJIRO TSUBOYAMA AKIRA MIURA SEISHI MORIYAMA TAKASHI KAMATANI JUN FURUGORI MANABU		
发明人	TAKIGUCHI, TAKAO OKADA, SHINJIRO TSUBOYAMA, AKIRA MIURA, SEISHI MORIYAMA, TAKASHI KAMATANI, JUN FURUGORI, MANABU		
IPC分类号	H01L51/50 C07F15/00 C09K11/06 H01L51/00 H01L51/30		
CPC分类号	H01L51/0085 C07F15/0033 H01L51/0059 H01L51/0081 H01L51/5012		
优先权	2001064254 2001-03-08 JP 2002042522 2002-02-20 JP		
其他公开文献	EP1238981A2 EP1238981B1		
外部链接	Espacenet		

摘要(译)

提供了一种具有含有特定金属配位化合物的层的电致发光器件。金属配位化合物由下式（1）表示：MLmL'n（1），其中M是Ir，Pt，Rh或Pd的金属原子; L和L'是相互不同的二齿配体; m为1,2或3，n为0,1或2，条件是m + n为2或3;部分结构MLm由下面所示的式（2）表示，部分结构ML'n由下面所示的式（3）或（4）表示：至少一个环状基团的任选取代基，和环状基团CyC1和CyC2包括能够具有由下式（5）表示的取代基的芳族基团：具有芳族基团的金属配位化合物可有效地提供高效发光和长期高亮度。