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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

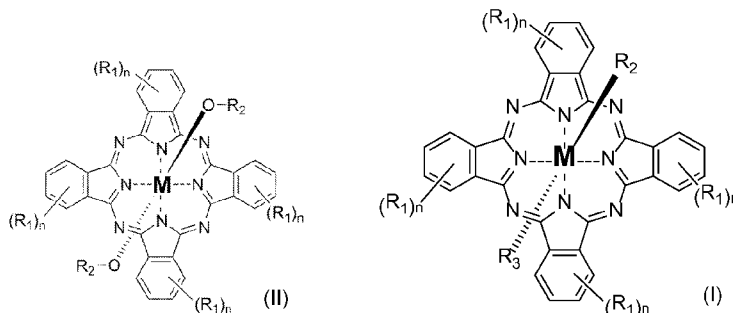
Published:

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(88) Date of publication of the international search report:

2 April 2015

(54) Title: ARYLOXY-PHTHALOCYANINES OF GROUP IV METALS FOR USE IN SOLAR CELLS



(57) Abstract: The application relates to a compound comprising an aryloxy-phthalocyanine compound of group IV metals, a method for preparing said compound and an article of manufacture made therefrom. Formula (II) & (I) Variable M comprises Si, Ge, Sn; the other variables are as defined in the claims. Also claimed are photovoltaic cells comprising such compounds.



INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/000984

A. CLASSIFICATION OF SUBJECT MATTER

INV. C07F7/02 C07F7/22 C07F7/30 H01L51/00 H01L31/00
 ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C07F H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>JP 2009 193763 A (KONICA MINOLTA HOLDINGS INC) 27 August 2009 (2009-08-27) SiPc compounds such as I-19 and I-20 on page 25 with then central Si atom coordinated axially with two substituted phenoxy-substituents methods of making the Si-Pc compounds that comprise a) providing a C12-SiPc compound, b) providing a reactant in the form of an alcohol in toluene and c) to react both to give a formula (I) compound: See scheme on page 33, according to which procedure I-19 was produced. use of these compounds in photoelectric semiconductor devices and solar cells: claims 7 and 9</p> <p style="text-align: center;">----- -/--</p>	1-13, 15-27

 Further documents are listed in the continuation of Box C.

 See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

5 September 2014

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/000984

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	<p>EP 2 644 660 A1 (KONICA MINOLTA BUSINESS TECH [JP]) 2 October 2013 (2013-10-02)</p> <p>Compounds 1-10 and 1-22 of table 1, page 8 A method to make these:Reference examples 3 and 5 on page 45</p>	1-7, 10-13, 15,16, 19-25
X	<p>-----</p> <p>JP 2012 028607 A (KONICA MINOLTA HOLDINGS INC) 9 February 2012 (2012-02-09) compound I-19, I-25, I-35 on pages 12, 14 and 17 respectively. Dichloro - and Dihydroxy-[29H,31H-phthalocyaninato(2-)-kappa.N29,.kappa.N30,.kappa.N31,.kappa.N32]-silicon on page 21 Method of making formula (I) compounds comprising the steps: a) of providing Dichloro-SiPc b) providing a reactant with arylalcohol group c) reacting Dichloro-SiPc with DBU in toluene: see scheme on page 23 to provide compound I-12. A solar cell device with such compounds: claim 6</p>	1-13, 15-27
X	<p>-----</p> <p>JP 2011 155185 A (KONICA MINOLTA HOLDINGS INC) 11 August 2011 (2011-08-11)</p> <p>Compound D-17, page 19 use of compounds in solar cells: claim 6</p>	10-18, 22,23, 25,27
X	<p>-----</p> <p>XUEBING LENG ET AL: "Axial Coordination of Porphyrinatocobalt(II) Complexes with Bis(pyridinolato)silicon(IV) Phthalocyanines", EUROPEAN JOURNAL OF INORGANIC CHEMISTRY, vol. 2007, no. 29, 2007, pages 4615-4620, XP055138354, ISSN: 1434-1948, DOI: 10.1002/ejic.200700451 Compounds 1 and 2 on page 4616</p>	1
X	<p>-----</p> <p>JIAN-YONG LIU ET AL: "Switching the photo-induced energy and electron-transfer processes in BODIPY-phthalocyanine conjugates", CHEMICAL COMMUNICATIONS, no. 12, 2009, page 1517, XP055138356, ISSN: 1359-7345, DOI: 10.1039/b821630d Compounds 2 and 7, page 1518</p> <p>-----</p> <p style="text-align: center;">-/--</p>	1,10,19

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/000984

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>HUANG J-D ET AL: "Photodynamic activities of a dicationic silicon(IV) phthalocyanine and its bovine serum albumin conjugates", TETRAHEDRON LETTERS, PERGAMON, GB, vol. 44, no. 43, 20 October 2003 (2003-10-20), pages 8029-8032, XP004458768, ISSN: 0040-4039, DOI: 10.1016/J.TETLET.2003.07.007 Compounds 2, 3 and 1 and the method of making 3 according to scheme 1: -----</p>	1,10, 19-25
T	<p>JP H04 360150 A (MITSUBISHI PAPER MILLS LTD) 14 December 1992 (1992-12-14) Diphenoxy-Germanium-phthalocyanine complex on page 382 in combination with page 383, [11], [13], [15] and [16] Use for solar cells; abstract -----</p>	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2014/000984

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-27 (partially)

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-27(partially)

Phthalocyanine compounds of formula (I) or (II), where the central atom variable "M" is Silicon; Methods to make such compounds and photovoltaic cells therewith.

2. claims: 1-27(partially)

Phthalocyanine compounds of formula (I) or (II), where the central atom variable "M" is Germanium; Methods to make such compounds and photovoltaic cells therewith.

3. claims: 1-27(partially)

Phthalocyanine compounds of formula (I) or (II), where the central atom variable "M" is Tin; Methods to make such compounds and photovoltaic cells therewith.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2014/000984

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2009193763 A	27-08-2009	JP 5217479 B2 JP 2009193763 A	19-06-2013 27-08-2009

EP 2644660 A1	02-10-2013	CN 103365133 A EP 2644660 A1 JP 5569549 B2 JP 2013203818 A US 2013260306 A1	23-10-2013 02-10-2013 13-08-2014 07-10-2013 03-10-2013

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