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(54) Title: SEMICONDUCTING COMPOUNDS AND DEVICES INCORPORATING SAME

(57) Abstract: Disclosed are semiconducting compounds having one or more phthalimide units and/or one or more head-to-head (H-H) substituted biheteroaryl units. Such compounds can be monomeric, oligomeric, or polymeric, and can exhibit desirable electronic properties and possess processing advantages including solution-processability and/or good stability at ambient conditions.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/001038

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01L51/00

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)

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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WITZEL, S., OTT, C. AND KLEMM, E.: "New Poly(arylene ethynylene)s Consisting of Electron-Deficient Aryleneimide Units", MACROMOL. RAPID COMMUN., vol. 26, 27 May 2005 (2005-05-27), pages 889-894, XP002592131,	1-9, 11, 15, 41-45, 47, 50
A	page 889, column 1, lines 1-4; figure scheme 1	10, 12-14, 16, 17, 46, 48, 49
A	----- DIERSCHKE, F., JACOB, J. AND MÜLLEN, K.: "A hybrid polymer of polyaniline and phthalimide dyes", SYNTHETIC METALS, vol. 156, 1 March 2006 (2006-03-01), pages 433-443, XP002592132, figure scheme 1 -----	1-17, 41-50
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 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 document 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.

Z document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/001038

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	WO 2009/098250 A1 (BASF SE [DE]; POLYERA CORP [US]; FACCHETTI ANTONIO [US]; YAN HE [US];) 13 August 2009 (2009-08-13) paragraphs [0058], [0071], [0072]	1-17, 41-50
X	EP 1 710 266 A1 (KONICA MINOLTA HOLDINGS INC [JP]) 11 October 2006 (2006-10-11) page 14; compound 13 page 15; compound 16 page 16; compound 25 page 16; compound 31 example 1; table 1; compound TFT element 7	18,20, 22,24, 26, 29-31, 35,41,42
X	EP 1 615 237 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 11 January 2006 (2006-01-11) paragraphs [0044], [0048]; figure 2; table 1	18,24, 26, 29-31, 35,41,42
X	LEE, B.-L., HAN, K.-M., LEE, E.-K., KANG, I.-N., KIM, D.H. AND LEE, S.: "Semiconducting Polymers based on electron-donating bithiophene and electron-accepting 5,5'-bithiazole units for organic thin-film transistors", SYNTHETIC METALS, vol. 159, 9 October 2008 (2008-10-09), pages 132-136, XP002610463, page 132, column 2, line 16 - line 19; figure scheme 1 page 134, column 1, line 11 - line 60	18, 24-26, 29-31, 35,40-42
X	HE, Y., POLITIS, J.K., CHENG., H., CURTIS, M. D., KANICKI, J.: "Characterization and stability of light-emitting diodes based on poly(bithiazole)'s", IEEE TRANSACTIONS ON ELECTRON DEVICES, vol. 44, no. 8, August 1997 (1997-08), pages 1282-1288, XP002610464, page 1282, column 2, lines 24-26; figure 1a	18,24, 26, 29-31, 34,40
X	US 2006/249712 A1 (HEENEY MARTIN [GB] ET AL) 9 November 2006 (2006-11-09) paragraph [0158] - paragraph [0163]; examples 3,4	18,24, 28-31, 35,41,42

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/001038

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>CROUCH, D.J., SKABARA, P.J., HEENEY, M., MCCULLOCH, I., SPARROWE, D., COLES, S.J., HURSTHOUSE, M.B.: "Hexyl-substituted oligoselenophenes with central tetrafluorophenylene units: synthesis, characterisation and application in organic field effect transistors", MACROMOL. RAPID COMMUN., vol. 29, 15 October 2008 (2008-10-15), pages 1839-1843, XP002610465, page 1840, column 2, line 52 - page 1842, column 1, line 15; figures 1, scheme 1; compounds 6,7,16,17</p>	<p>18,24, 28-31, 35,39-42</p>
X	<p>-----</p> <p>GUO, X. AND WATSON, M.D.: "Conjugated Polymers from Naphthalene Bisimide", ORGANIC LETTERS, vol. 10, no. 23, 4 November 2008 (2008-11-04), pages 5333-5336, XP002610466, page 5333, column 1, lines 1-3; figure scheme 1; compounds 2b, 2d page 5336, column 2, lines 29-34</p> <p>-----</p>	<p>18-21, 24,25, 29-34, 36,40,41</p>
X	<p>-----</p> <p>WANG, Y. AND WATSON, M.D.: "Tuning the properties of alternating copolymers from fluorobenzene and thiophene derivatives", POLYMER PREPRINTS, vol. 48, no. 2, 2007, pages 127-127, XP002610467, column 1, lines 3-4; figure 1</p> <p>-----</p>	<p>18,24, 25, 29-31, 34,38, 39,41, 43-45</p>
X	<p>-----</p> <p>NISHIOKA, Y., WANG, S., AND YOSHINO, K.: "Electrical and optical properties of poly(3-alkylfuran) and their dopping effect", SYNTHETIC METALS, vol. 41-43, 1991, pages 815-818, XP002610468, page 815, line 21 - page 816, line 24</p> <p>-----</p>	<p>18,24, 27,37</p>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/001038

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.:

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: 1-17, 46-48(completely); 41-45, 49, 50(partially)

an electronic, optical or optoelectronic device comprising a semiconductor component comprising a monomeric, oligomeric or polymeric compound comprising a phthalimide 3,6-diy1 unit;

2. claims: 18-40(completely); 41-45, 49, 50(partially)

an electronic, optical or optoelectronic device comprising a semiconductor component comprising an oligomeric or polymeric compound comprising a specific biheteroaryl unit;

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/001038

Patent document cited in search report	A1	Publication date	Patent family member(s)	Publication date
WO 2009098250	A1	13-08-2009	CA 2711764	A1 13-08-2009
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