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BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
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ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
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(54) Title: CONJUGATED POLYMERS

(57) Abstract: The invention relates to novel conjugated polymers containing repeating units derived from carbonylsubstituted benzodithiophene and repeating units derived from halogenated benzotriazole, to methods for their preparation and educts or intermediates used therein, to polymer blends, mixtures and formulations containing them, to the use of the polymers, polymer blends, mixtures and formulations as organic semiconductors in organic electronic (OE) devices, especially in organic photovoltaic (OPV) devices and organic photodetectors (OPD), and to OE, OPV and OPD devices comprising these polymers, polymer blends, mixtures or formulations.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2013/000357

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.:

1-23, 25

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.

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER INV. C08G61/12 C08L65/00 H01B1/12 H01L51/00 H01L51/42 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) C08G C08L C09D C09J H01B 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, CHEM ABS Data, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PRICE S C ET AL: "Fluorine substituted conjugated polymer of medium band gap yields 7% efficiency in polymer - Fullerene solar cells", JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, ACS PUBLICATIONS, US, vol. 133, no. 12, 30 March 2011 (2011-03-30), pages 4625-4631, XP002665448, ISSN: 0002-7863, DOI: 10.1021/JA1112595 [retrieved on 2011-03-04] the whole document -----	1-23,25
Y	WO 2011/131280 A1 (MERCK PATENT GMBH [DE]; TIERNEY STEVEN [GB]; BLOUIN NICOLAS [GB]; MITC) 27 October 2011 (2011-10-27) page 1, line 4 - page 3, line 7 page 24, line 23 - page 25, line 3 claims 1-3 -----	1-23,25
☐ 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 16 May 2013	Date of mailing of the international search report 18/10/2013	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Meiners, Christian	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011131280 A1	27-10-2011	CN 102844312 A	26-12-2012
		DE 112011101363 T5	07-02-2013
		EP 2560965 A1	27-02-2013
		GB 2492305 A	26-12-2012
		JP 2013530258 A	25-07-2013
		KR 20130066615 A	20-06-2013
		SG 184448 A1	29-11-2012
		TW 201141902 A	01-12-2011
		US 2013043434 A1	21-02-2013
		WO 2011131280 A1	27-10-2011

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-23, 25

Polymers according to claim 1, mixtures, blends, or formulations comprising them, use of the said materials as active material in devices as defined in claim 19, devices of claims 21-23, and processes of preparing such polymers according to claim 25.

2. claim: 24

Monomeric compounds of formula V as defined in claim 24.
