



- (51) **International Patent Classification:**
C08G 61/12 (2006.01) H01L 31/00 (2006.01)
C08G 73/06 (2006.01)
- (21) **International Application Number:**
PCT/US20 12/043004
- (22) **International Filing Date:**
18 June 2012 (18.06.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/498,390 17 June 2011 (17.06.2011) US
61/645,970 11 May 2012 (11.05.2012) US
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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,

[Continued on nextpage]

- (54) **Title:** REGIOREGULAR PYRIDAL[2,1,3]THIADIAZOLE π -CONJUGATED COPOLYMERS FOR ORGANIC SEMICONDUCTORS

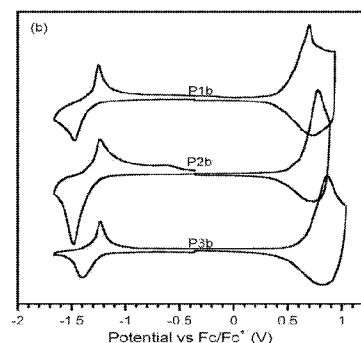
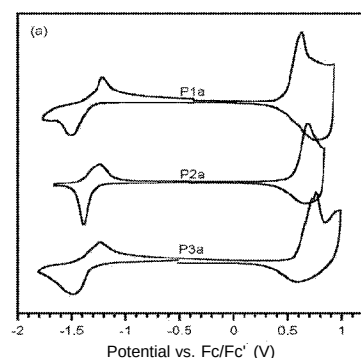


FIG. 6

(57) **Abstract:** A method of regioselectively preparing a pyridine-containing compound is provided. In particular embodiments, the method includes reacting halogen-functionalized pyridal[2,1,3]thiadiazole with organotin-functionalized cyclopenta[2,1-6:3,4-6'] dithiophene or organotin-functionalized indaceno[1,2-b:5,6-b']dithiophene. Also provided is a method of preparing a polymer. The method includes regioselectively preparing a monomer that includes a pyridal[2,1,3]thiadiazole unit; and reacting the monomer to produce a polymer that includes a regioregular conjugated backbone section, wherein the section includes a repeat unit containing the pyridal[2,1,3]thiadiazole unit. A polymer that includes a regioregular conjugated backbone section, and electronic devices that include the polymer, are also provided.

DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,

TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

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

20 June 2013

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/043004**A. CLASSIFICATION OF SUBJECT MATTER****C08G 61/12(2006.01)i, C08G 73/06(2006.01)1, H01L 31/00(2006.01)1**

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)

C08G61/00, C08G61/12, H01B1/00, H01B1/12, H01L51/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & keywords: regioregular, main chain, polymer, pyridine, dithiophene, organic semiconductor.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	YING, LEI et al., "Regioregular Pyridal [2,1,3] thiadiazole π -Conjugated Copolymers", J. Am. Chem. Soc. 2011, Vol. 133, 18538-18541. (21 September 2011) See abstract; page 18538, left column, lines 21-29; page 18538, right column, line 13-page 18539, left column, line 29; page 18540, right column, lines 21-32; page 18540, right column, line 46-page 18541, left column, line 18; Figures 3, 4; Schemes 1, 2.	1-29
X A	WO 2008-143850 A2 (PLEXTRONICS, INC.) 27 November 2008 See abstract & claim 1.	19 1-18, 20-29
X A	KR 10-2008-0072929 A (MERCK PATENT GMBH) 07 August 2008 See abstract & claim 1.	19 1-18, 20-29
A	US 2011-0003967 A1 (AMB, CHAD MARTIN et al.) 06 January 2011 See abstract; claims 1 & 4-5; paragraph [0026].	1-29
A	US 2010-0180944 A1 (GAUDIANA, RUSSELL et al.) 22 July 2010 See abstract; claim 1; paragraphs [0015], [0017], [0027], [0031], [0055], [0065], [0074], [0081]; Table 3.	1-29

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

13 FEBRUARY 2013 (13.02.2013)

Date of mailing of the international search report

14 FEBRUARY 2013 (14.02.2013)

Name and mailing address of the ISA/KR



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/043004

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2009-152165 A2 (PLEXTRONICS, INC.) 17 December 2009 See abstract; claims 1, 14, 20-22, 37, 40-41, 47-50 & 61-62.	1-29
A	US 2005-0059168 A1 (BAZAN, GUILLERMO c. et al.) 17 March 2005 See abstract; claims 1 & 42; paragraphs [0085] & [0087]-[0088] ; Tables 1-2.	1-29

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