



(51) International Patent Classification:

B01J 23/72 (2006.01) *B01J 21/08* (2006.01)
B01J 23/46 (2006.01)

(21) International Application Number:

PCT/US2012/039388

(22) International Filing Date:

24 May 2012 (24.05.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/493,099 3 June 2011 (03.06.2011) 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, 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))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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

28 February 2013

(54) Title: BIO-OIL UPGRADING PROCESS

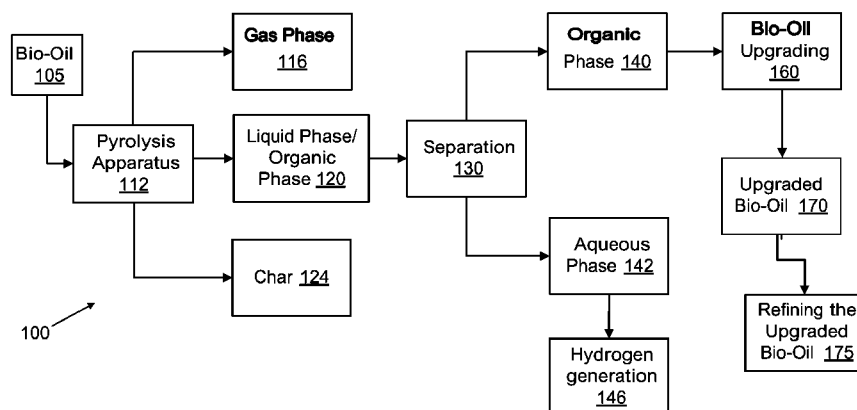


FIGURE 1

(57) **Abstract:** A method for upgrading pyrolysis oil into a hydrocarbon fuel involves obtaining a quantity of pyrolysis oil, separating (130) the pyrolysis oil into an organic phase and an aqueous phase, and then upgrading (160) the organic phase into a hydrocarbon fuel by reacting the organic phase with hydrogen gas using a catalyst. The catalyst used in the reaction includes a support material, an active metal and a zirconia promoter material. The support material may be alumina, silica gel, carbon, silicalite or a zeolite material. The active metal may be copper, iron, nickel or cobalt. The zirconia promoter material may be zirconia itself, zirconia doped with Y, zirconia doped with Sc and zirconia doped with Yb.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/039388**A. CLASSIFICATION OF SUBJECT MATTER*****B01J 23/72(2006.01)i, B01J 23/46(2006.01)i, B01J 21/08(2006.01)i***

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)

B01J 23/72; B01J 27/24; C10L 1/02; B01J 23/56; C10G 29/00; B01J 23/26; C10G 1/10; B01J 23/42

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: catalyst, upgrading, pyrolysis oil, hydrocarbon fuel, hydrogen, copper, zirconia, doped, alumina

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2010-124030 A1 (SAPPHIRE ENERGY, INC.) 28 October 2010 See claims 1, 9, 19-25, 34	1-11
A	WO 2011-012900 A2 (JOHNSON MATTHEY PLC) 03 February 2011 See abstract; claims 1-6, 12	1-11
A	US 2009-0259082 A1 (GREGG ANTHONY DELUGA et al.) 15 October 2009 See abstract; paragraph [0045]; claims 1-2, 11	1-11
A	US 2011-0119994 A1 (JOHANNES ANTONIUS HOGENDOORN et al.) 26 May 2011 See claims 1, 18	1-11

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

* Special categories of cited documents:

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Date of the actual completion of the international search

26 DECEMBER 2012 (26.12.2012)

Date of mailing of the international search report

27 DECEMBER 2012 (27.12.2012)

Name and mailing address of the ISA/KR

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Facsimile No. 82-42-472-7140

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/039388

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