(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 March 2013 (21.03.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/039950 A3

(51) **International Patent Classification**:
C10G 47/02 (2006.01) *C10G 45/04* (2006.01)

(21) **International Application Number**:
PCT/US2012/054723

(22) **International Filing Date**:
12 September 2012 (12.09.2012)

(25) **Filing Language**: English

(26) **Publication Language**: English

(30) **Priority Data**:
13/233,455 15 September 2011 (15.09.2011) US
13/233,477 15 September 2011 (15.09.2011) US
13/233,491 15 September 2011 (15.09.2011) US

(71) **Applicant** *(for all designated States except US)*: **CHEVRON U.S.A. INC.** [US/US]; 6001 Bollinger Canyon Road, San Ramon, CA 94583 (US).

(72) **Inventors; and**

(75) **Inventors/Applicants** *(for US only)*: **YANG, Shuwu** [CN/US]; 6001 Bollinger Canyon Road, San Ramon, CA 94583 (US). **CHABOT, Julie** [CA/US]; 6001 Bollinger Canyon Road, San Ramon, CA 94583 (US). **REYNOLDS, Bruce, Edward** [US/US]; 6001 Bollinger Canyon Road, San Ramon, CA 94583 (US). **KOU, Bo** [CA/US]; 6001 Bollinger Canyon Road, San Ramon, CA 94583 (US).

(74) **Agents**: **ELLINWOOD, Steven, R.** et al.; Chevron Corporation, Law Department, Post Office Box 6006, San Ramon, CA 94583-0806 (US).

(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, BN, 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, PA, 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).

[Continued on next page]

(54) **Title**: HYDROPROCESSING CATALYSTS AND METHODS FOR MAKING THEREOF

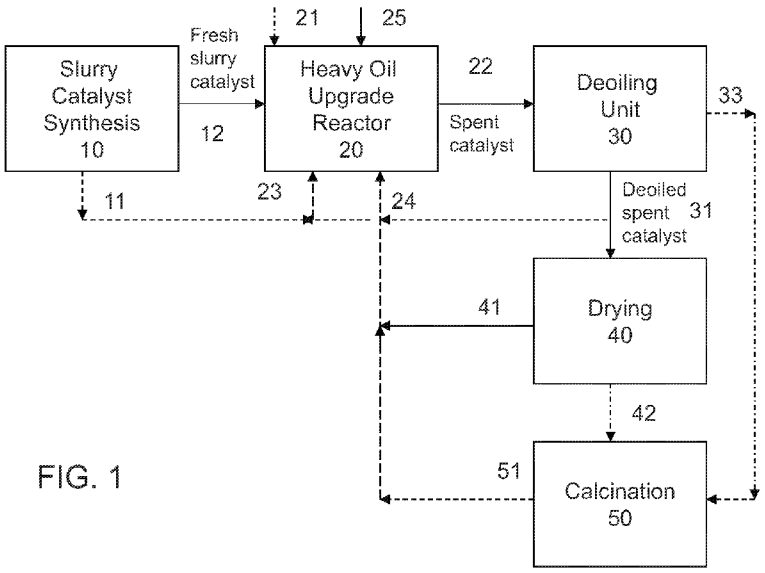

FIG. 1

(57) **Abstract**: Methods for preparing and an improved slurry catalyst feed system for heavy oil upgraded are provided. The catalyst feed system comprises a fresh slurry catalyst and a deoiled spent catalyst in an amount of at least 10% the catalyst feed system. The deoiled spent catalyst is a slurry catalyst that has been used in a hydroprocessing operation with more than 10% but less than 80% of original catalytic activity, and containing less than 10 wt. % soluble hydrocarbons as unconverted heavy oil feed. In one embodiment, the deoiled spent catalyst is first treated with a solution containing at least one of plain water, a mineral acid, an oxidizing agent, and combinations thereof to reduce the concentration of at least one metal contaminant in the deoiled spent catalyst by at least 40%.

WO 2013/039950 A3

Declarations under Rule 4.17:

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

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

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

(88) Date of publication of the international search report:
27 June 2013