



(51) International Patent Classification:

B01J 29/40 (2006.01) **B01J 35/00** (2006.01)
B01J 37/28 (2006.01) **C07C 1/20** (2006.01)
B01J 35/10 (2006.01)

(21) International Application Number:

PCT/US2012/060369

(22) International Filing Date:

16 October 2012 (16.10.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/548,064	17 October 2011 (17.10.2011)	US
61/548,052	17 October 2011 (17.10.2011)	US
61/548,015	17 October 2011 (17.10.2011)	US
61/548,057	17 October 2011 (17.10.2011)	US
61/548,038	17 October 2011 (17.10.2011)	US
61/548,044	17 October 2011 (17.10.2011)	US

(71) **Applicant: EXXONMOBIL RESEARCH AND ENGINEERING COMPANY** [US/US]; 1545 Route 22 East, P.O. Box 900, Annandale, NJ 08801-0900 (US).

(72) **Inventors: BEUTEL, Tilman, W.**; 405 Mathers Lane, Neshanic Station, NJ 08853 (US). **MCCARTHY, Stephen, J.**; 4440 Devonshire Drive, Center Valley, PA 18034 (US). **WALDRUP, Beau**; 102 Sir Cameron, Lumberton, TX 77657 (US). **DAAGE, Michel, A.**; 1847 Viola Lane, Hellertown, PA 18055 (US). **HICKEY, Karlton, J.**; 1132 Red Oak Drive, Boothwyn, PA 19061 (US).

(74) **Agents: WEISBERG, David, M.** et al.; Exxonmobil Research and Engineering Company, 1545 Route 22 East, P.O. Box 900, Annandale, NJ 08801-0900 (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).

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))

(54) **Title:** PHOSPHORUS MODIFIED ZEOLITE CATALYST

(57) **Abstract:** A bound phosphorus-modified catalyst composition comprises a zeolite having a silica to alumina molar ratio of at least 40, phosphorus in an amount between about 0.1 wt% and about 3 wt% of the total catalyst composition, and a binder essentially free of aluminum. The bound catalyst composition can advantageously exhibit at least one of: (a) microporous surface area of at least 340 m²/g; (b) an alpha value after steaming in ~100% steam for ~96 hours at ~1000°F (~538°C) of at least 40; and (c) a coke deactivation rate constant <0.05 after steaming in ~100% steam for ~96 hours at ~1000°F (~538°C). The bound catalyst, as calcined, can advantageously also exhibit (i) 2,2-dimethylbutane diffusivity >~1.5 x 10 sec⁻¹ measured at ~120°C and ~60 torr (~8 kPa) and (ii) a coke deactivation rate constant <~0.15.



WO 2013/059162 A1