

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
26 June 2008 (26.06.2008)

PCT

(10) International Publication Number
WO 2008/076589 A1

(51) International Patent Classification:

C08F 10/06 (2006.01) **C08F 4/62** (2006.01)
C08F 2/06 (2006.01)

(21) International Application Number:

PCT/US2007/085365

(22) International Filing Date:

21 November 2007 (21.11.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/876,193	20 December 2006 (20.12.2006)	US
11/714,546	6 March 2007 (06.03.2007)	US
60/905,247	6 March 2007 (06.03.2007)	US
11/854,936	13 September 2007 (13.09.2007)	US

(71) Applicants (for all designated States except US):

EXXONMOBIL CHEMICAL PATENTS INC. [US/US]; A Corporation Of The State Of Delaware, 5200 Bayway Drive, Baytown, TX 77520 (US). **EXXONMOBIL RESEARCH AND ENGINEERING COMPANY** [US/US]; 1545 Route 22 East, Annandale, NJ 08801-0900 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **FRIEDERSDORF, Chris** [US/US]; 2514 Stately Oak, Kingwood, TX 77345 (US). **BRANT, Patrick** [US/US]; 1038 Shorewood Drive, Seabrook, TX 77586 (US). **KISS, Gabor** [HU/US]; 4 Thomas Court, Hampton, NJ 08827 (US).

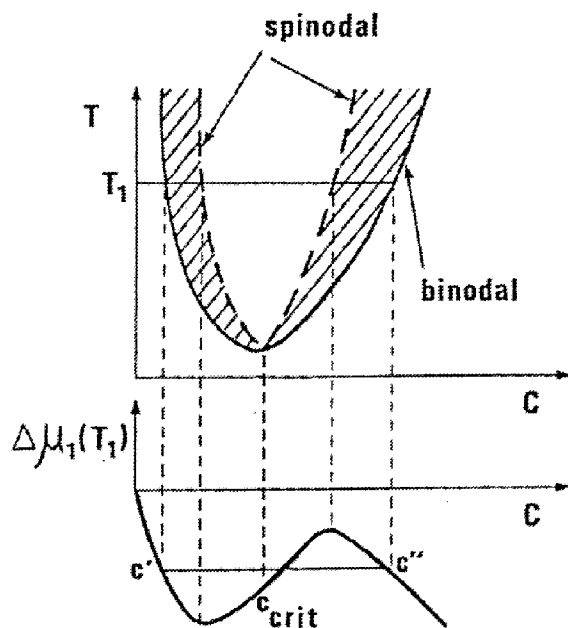
(74) Agents: **BELL, Catherine, L.** et al.; EXXONMOBIL CHEMICAL COMPANY, P.O. Box 2149, Baytown, TX 77522-2149 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

[Continued on next page]

(54) Title: PHASE SEPARATOR AND MONOMER RECYCLE FOR SUPERCRITICAL POLYMERIZATION PROCESS



a polymer-rich phase and a monomer rich phase either before or after collecting the polymer-monomer mixture in the separation vessel where the pressure in the reactor (or at least one reactor if more than one is in use) is between 7 and 100 MPa higher than the pressure in the separation vessel and the temperature in the separation vessel is above the crystallization temperature of the polymer or above 80°C if the polymer has no crystallization temperature, whichever is higher; (f) separating the monomer-rich phase from the polymer-rich phase; (g) recycling the separated monomer-rich phase to one or more reactors of (a); and (h) recovering polymer from the polymer-rich phase.

(57) Abstract: This invention relates to a process for polymerizing olefins, comprising the steps of: (a) contacting in one or more reactors, in a dense fluid homogeneous polymerization system, olefin monomers having three or more carbon atoms present at 30 weight % or more (based upon the weight of the monomers and comonomers entering the reactor), with: 1) one or more catalyst compounds, 2) one or more activators, 3) from 0 to 50 mole % comonomer (based upon the amount of the monomers and comonomers entering the reactor), and 4) 0 to 40 wt % diluent or solvent (based upon the weight of the polymerization system), at a temperature above the crystallization temperature of the polymerization system and a pressure no lower than 10 MPa below the cloud point pressure of the polymerization system and less than 200 MPa, where the polymerization system comprises the monomers, any comonomer present, any diluent or solvent present, any scavenger present, and the polymer product; (b) forming a reactor effluent comprising a polymer-monomer mixture; (c) optionally heating the polymer-monomer mixture of (b) after it exits the reactor and before or after the pressure is reduced in step (e); (d) collecting the polymer-monomer mixture of (b) in a separation vessel; (e) reducing the pressure of the reactor effluent comprising the polymer-monomer mixture of (b) below the cloud point pressure to form a two-phase mixture comprising

WO 2008/076589 A1



ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,
PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*