



(51) International Patent Classification:

C08F 210/16 (2006.01) *C08F 2/06* (2006.01)
C08L 23/08 (2006.01) *C08J 3/20* (2006.01)
C08J 5/18 (2006.01)

(21) International Application Number:

PCT/US2012/027312

(22) International Filing Date:

1 March 2012 (01.03.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/468,467 28 March 2011 (28.03.2011) US

(71) Applicant (for all designated States except US): **DOW GLOBAL TECHNOLOGIES LLC** [US/US]; 2040 Dow Center, Midland, MI 48674 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **EFFLER, Lawrence, J.** [US/US]; 14206 Stone Bluff Lane, Rosharon, TX 77583 (US). **KARJALA, Teresa, P.** [US/US]; 56 Mandevilla Court, Lake Jackson, TX 77566 (US). **DEMIRORS, Mehmet** [NL/US]; 2319 Bending Spring Drive, Pearland, TX 77584 (US). **SAVARGAONKAR, Nilesh, R.** [US/US]; 3315 Endicott Lane, Pearland, TX 77584 (US). **BENSASON, Selim** [TR/CH]; Alte Landstrasse 114, CH-8804 Au (CH). **ZHOU, Zhe** [US/US]; 144 Indian Warrior, Lake Jackson, TX 77566 (US).

(74) Agent: **FRIEDRICH, Valerie**; JL Salazar Law Firm, 1934 West Gray Street, Suite 401, Houston, TX 77019 (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, 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, MD, 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:

10 January 2013

(54) Title: PROCESS TO PRODUCE ENHANCED MELT STRENGTH ETHYLENE/ALPHA-OLEFIN COPOLYMERS AND ARTICLES THEREOF

(57) Abstract: An ethylene/a-olefin copolymer comprising units derived from ethylene; and units derived from at least one α -olefin; wherein the ethylene/a-olefin copolymer has a density in the range of from 0.90 to 0.94 g/cc; a melt index (I2) in the range of from 0.05 to 50 dg/min; an Mw/Mn of from 3 to 5; and from 300 to 500 vinyl unsaturations per 1,000,000 carbon atoms in the ethylene/a-olefin copolymer is provided. Also provided is a process for producing an ethylene/ α -olefin copolymer comprising: (1) polymerizing ethylene and one or more α -olefins in a polymerization reactor; (2) thereby producing an enhanced melt strength ethylene/a-olefin copolymer having from 300 to 500 vinyl unsaturation units per 1,000,000 carbon atoms, a density in the range of from 0.90 to 0.94 g/cc; a melt index (I2) in the range of from 0.05 to 50 dg/min; and a Mw/Mn of from 3 to 5.



WO 2012/134700 A3

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/027312

A. CLASSIFICATION OF SUBJECT MATTER

INV. C08F210/16 C08L23/08 C08J5/18 C08F2/05 C08J3/20
ADD.

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)

C08F

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2011/085379 A1 (DOW GLOBAL TECHNOLOGIES LLC [US]; DOW BRAZIL S A [BR]; DEMIRORS MEHMET) 14 July 2011 (2011-07-14) page 7, line 18 - line 20 pages -; claims -----	1,11-18
X	WO 02/074817 A2 (DOW CHEMICAL CO [US]; STEVENS JAMES C [US]; VANDERLENDE DANIEL D [US]) 26 September 2002 (2002-09-26) claims -----	2-10
A		1,11-18
A	WO 2011/019563 A1 (DOW GLOBAL TECHNOLOGIES INC [US]; KARJALA TERESA P [US]; TICE COLLEEN) 17 February 2011 (2011-02-17) claims ----- -/-	1-18



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

29 October 2012

Date of mailing of the international search report

28/11/2012

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Kaumann, Edgar

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/027312

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 114 457 A (MARKEL ERIC J [US] ET AL) 5 September 2000 (2000-09-05) claims	1-18
A	----- WO 01/62808 A1 (UNIVATION TECH LLC [US]) 30 August 2001 (2001-08-30) claims -----	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/027312

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011085379 A1	14-07-2011	AR 079986 A1	07-03-2012
		AR 079987 A1	07-03-2012
		AR 079988 A1	07-03-2012
		AR 079989 A1	07-03-2012
		EP 2523980 A1	21-11-2012
		EP 2523981 A1	21-11-2012
		EP 2523991 A1	21-11-2012
		EP 2523992 A1	21-11-2012
		SG 182356 A1	30-08-2012
		SG 182357 A1	30-08-2012
		SG 182358 A1	30-08-2012
		SG 182359 A1	30-08-2012
		US 2011171407 A1	14-07-2011
		WO 2011085371 A1	14-07-2011
		WO 2011085375 A1	14-07-2011
		WO 2011085377 A1	14-07-2011
		WO 2011085379 A1	14-07-2011
WO 02074817 A2	26-09-2002	AR 033002 A1	03-12-2003
		AR 033003 A1	03-12-2003
		AU 2002258526 B2	02-11-2006
		AU 2007200466 A1	22-02-2007
		AU 2007203338 A1	09-08-2007
		BR 0208485 A	09-03-2004
		BR 0208486 A	09-03-2004
		CA 2441028 A1	26-09-2002
		CA 2441262 A1	26-09-2002
		CN 1527847 A	08-09-2004
		CN 1538977 A	20-10-2004
		CN 1827652 A	06-09-2006
		CN 101143908 A	19-03-2008
		CZ 20032816 A3	10-11-2004
		CZ 20032817 A3	10-11-2004
		EP 1377613 A2	07-01-2004
		EP 1412398 A2	28-04-2004
		JP 4249984 B2	08-04-2009
		JP 2004527612 A	09-09-2004
		JP 2004536895 A	09-12-2004
		JP 2008179825 A	07-08-2008
		JP 2008231433 A	02-10-2008
		JP 2012007176 A	12-01-2012
		KR 20080032657 A	15-04-2008
		KR 20080032658 A	15-04-2008
		MX PA03008321 A	11-12-2003
		MX PA03008322 A	11-12-2003
		MY 137183 A	30-01-2009
		NO 20034078 A	17-11-2003
		NO 20034079 A	17-11-2003
		PL 364603 A1	13-12-2004
		US RE42276 E1	05-04-2011
		US RE43004 E1	06-12-2011
		US 2003065097 A1	03-04-2003
		US 2003088037 A1	08-05-2003
		US 2005020778 A1	27-01-2005
		US 2005065286 A1	24-03-2005
		US 2005187350 A1	25-08-2005
		US 2005187351 A1	25-08-2005
		WO 02074816 A2	26-09-2002

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/027312

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 02074817 A2	26-09-2002

WO 2011019563 A1	17-02-2011	CA 2768705 A1	17-02-2011
		CN 102574946 A	11-07-2012
		EP 2464672 A1	20-06-2012
		KR 20120052295 A	23-05-2012
		SG 178309 A1	29-03-2012
		US 2012130019 A1	24-05-2012
		WO 2011019563 A1	17-02-2011

US 6114457 A	05-09-2000	NONE	

WO 0162808 A1	30-08-2001	AU 3321001 A	03-09-2001
		BR 0108563 A	12-11-2002
		CA 2400665 A1	30-08-2001
		EP 1263816 A1	11-12-2002
		JP 2003524038 A	12-08-2003
		WO 0162808 A1	30-08-2001
