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(71) Applicant (for all designated States except US): **DOW GLOBAL TECHNOLOGIES INC.** [US/US]; Washington Street, 1790 Building, Midland, Michigan 48674 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HARRIS, William, J.** [US/US]; 216 Plum Circle, Lake Jackson, Texas 77566 (US). **WEAVER, John, D.** [US/US]; 122 Anchusa Street, Lake Jackson, Texas 77566 (US). **WALTHER, Brian,**

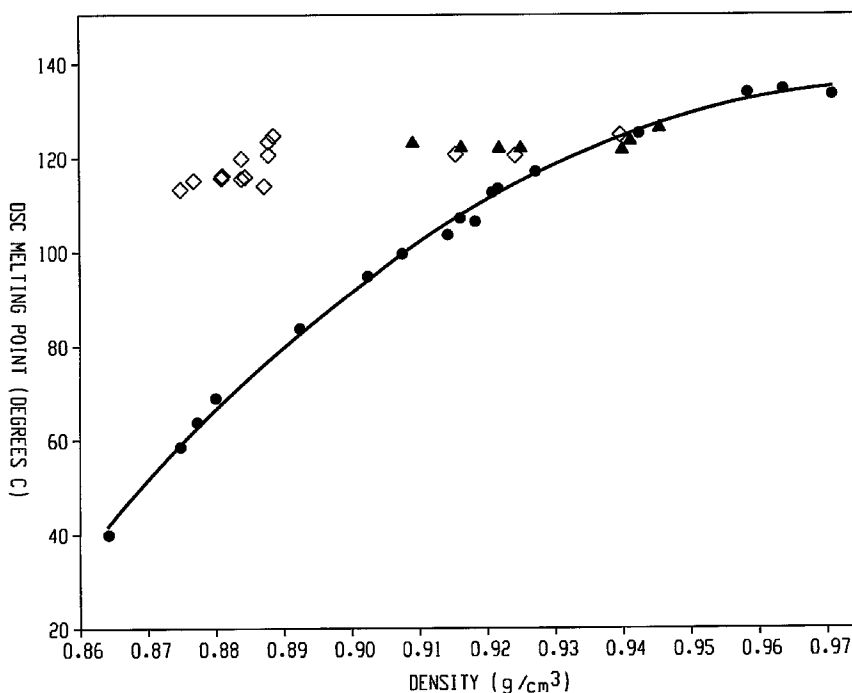
W. [US/US]; 309 Williamsburg, Clute, Texas 77531 (US). **HAHN, Stephen, F.** [US/US]; 313 Rosemary Lane, Lake Jackson, Texas 77566 (US). **CHEUNG, Yunwa, Wilson** [US/US]; 104 Rosemary Lane, Lake Jackson, Texas 77566 (US). **GUPTA, Pankaj, P.** [IN/US]; 110 Lake Road, Apt. 203, Lake Jackson, Texas 77566 (US). **HO, Thoi, H.** [US/US]; 54 Orchid Court, Lake Jackson, Texas 77566 (US). **REICHEK, Kenneth, N.** [US/US]; 115 Honeysuckle Street, Lake Jackson, Texas 77566 (US). **YALVAC, Selim** [US/US]; 11316 Starlight Bay Street, Pearland, Texas 77584 (US). **KARJALA, Teresa, P.** [US/US]; 56 Mandevilla Court, Lake Jackson, Texas 77566 (US). **ROZENBLAT, Benjamin, Roman** [US/US]; 2005 Taggert Drive, Belle Mead, New Jersey 08502 (US). **RICKEY, Cynthia, L.** [US/US]; 315 Carnation Street, Lake Jackson, Texas 77566 (US).

(74) Agents: **BAI, J. Benjamin** et al.; Jones Day, 717 TEXAS, Suite 3300, Houston, Texas 77002 (US).

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[Continued on next page]

(54) Title: FUNCTIONALIZED ETHYLENE/ α -OLEFIN INTERPOLYMER COMPOSITIONS



(57) Abstract: The invention relates to functionalized interpolymers derived from base olefin interpolymers, which are prepared by polymerizing one or more monomers or mixtures of monomers, such as ethylene and one or more comonomers, to form an interpolymer products having unique physical properties. The functionalized olefin interpolymers contain two or more differing regions or segments (blocks), resulting in unique processing and physical properties.

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A. CLASSIFICATION OF SUBJECT MATTER
 INV. C08F255/00 C08F297/08 C08F295/00

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 practical, search terms used)

EPO-Internal, COMPENDEX, 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	EP 1 403 315 A (TOYO KASEI KOGYO COMPANY LIMITED; MITSUI CHEMICALS, INC) 31 March 2004 (2004-03-31) examples -----	1-4, 8, 34, 35
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A	EP 0 317 359 A (SUMITOMO CHEMICAL COMPANY, LIMITED) 24 May 1989 (1989-05-24) examples page 4, line 38 - line 59 examples; table 1 table 3 ----- -/--	1-4, 8, 34, 35

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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- *E* earlier document but published on or after the international filing date
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- *&* document member of the same patent family

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European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Thomas, Dominik

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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 5 476 905 A (SCHWAGER ET AL) 19 December 1995 (1995-12-19) example 10 -----	1-4, 8, 34, 35
A	DATABASE COMPENDEX [Online] ENGINEERING INFORMATION, INC., NEW YORK, NY, US; MOAD G: "Synthesis of polyolefin graft copolymers by reactive extrusion" XP002396539 Database accession no. EIX99374732320 the whole document & PROG POLYM SCI (OXFORD); PROGRESS IN POLYMER SCIENCE (OXFORD) 1999 ELSEVIER SCIENCE LTD, EXETER, ENGL, vol. 24, no. 1, 1999, pages 81-142, -----	1-4, 8, 34, 35
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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

International application No.
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Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4,8, 34,35

A composition comprising at least one functionalized olefin interpolymers, and wherein the functionalized olefin interpolymers is formed from an olefin interpolymers having at least one melting point, T_m , in degrees Celsius, and a density, d^* , in grams/cubic centimeter, and wherein the numerical values of the variables correspond to the relationship:
 $T_m > -2002.9 + 4538.5(d^*) - 2422.2(d^*)^2$, and wherein the olefin interpolymers has a M_w/M_n from 1.7 to 3.5

2. claims: 5-7

A composition comprising at least one silane functionalized olefin interpolymers wherein the functionalized olefin interpolymers is formed from an olefin interpolymers and at least one silane compound having at least one melting point, T_m , in degrees Celsius, and a density, d^* , in grams/cubic centimeter, and wherein the numerical values of the variables correspond to the relationship:
 $T_m > -2002.9 + 4538.5(d^*) - 2422.2(d^*)^2$, and wherein the olefin interpolymers has a M_w/M_n from 1.7 to 3.5

3. claims: 9-33

A composition comprising at least one functionalized multi-block interpolymers, and wherein the interpolymers is prepared from a multi-block interpolymers that comprises, in polymerized form, ethylene and one or more copolymerizable comonomers

4. claim: 36

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A functionalized ethylene/a-olefin interpolmer, wherein the functionalized ethylene/a-olefin interpolmer is the reaction product of at least one unsaturated compound containing at least one heteroatom and an ethylene/a-olefin interpolmer characterized by one or more of the following:

(a) a M_w/M_n from about 1.7 to about 3.5, and is characterized by a heat of fusion, ΔH in J/g, and a delta quantity, ΔT , in degrees Celsius defined as the temperature difference between the tallest DSC peak and the tallest CRYSTAF peak, wherein the numerical values of delta T and delta H have the following relationships:
 $\Delta T > -0.1299(\Delta H) + 62.81$ for ΔH greater than zero and up to 130 J/g,
 $\Delta T > 48$ deg. C for ΔH greater than 130 J/g, wherein the CRYSTAF peak is determined using at least 5 percent of the cumulative polymer, and if less than 5 percent of the polymer has an identifiable CRYSTAF peak, then the CRYSTAF temperature is 30 deg. C; or

(b) an elastic recovery, R_e , in percent at 300 percent strain and 1 cycle measured with a compression-molded film of the ethylene/a-olefin interpolmer, and has a density, d , in grams/cubic centimeter, wherein the numerical values of R_e and d satisfy the following relationship when ethylene/a-olefin interpolmer is substantially free of a cross-linked phase:
 $R_e > 1481 - 1629(d)$; or

(c) a molecular fraction which elutes between 40 deg. C and 130 deg. C when fractionated using TREF, characterized in that the fraction has a molar comonomer content of at least 5 percent higher than that of a comparable random ethylene interpolmer fraction eluting between the same temperatures, wherein said comparable random ethylene interpolmer has the same comonomer(s) and has a melt index, density, and molar comonomer content (based on the whole polymer) within 10 percent of that of the ethylene/a-olefin interpolmer; or

(d) has at least one molecular fraction which elutes between 40 deg. C and 130 deg. C when fractionated using TREF, characterized in that the fraction has a block index of at least 0.5 and up to about 1; or

(e) has an average block index greater than zero and up to about 1.0 and a molecular weight distribution, M_w/M_n , greater than about 1.3; or

(f) has a storage modulus at 25 deg. C, $G'(25 \text{ deg. C})$, and a storage modulus at 100 deg. C, $G'(100 \text{ deg. C})$, wherein the ratio of $G'(25 \text{ deg. C})$ to $G'(100 \text{ deg. C})$ is in the range of about 1:1 to about 9:1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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INTERNATIONAL SEARCH REPORT

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