Title: POLYMER BLENDS WITH ETHYLENE/α-OLEFIN INTERPOLYMERS

Abstract: Embodiments of the invention provide an impact modified composition comprising ethylene/α-olefin inter polymers. The ethylene/α-olefin inter polymers are characterized by an average block index, ABl, which is greater than zero and up to about 1.0 and a molecular weight distribution, Mw/Mn, greater than about 1.3. In addition or alternatively, the block ethylene/α-olefin interpolymer is characterized by having at least one fraction obtained by Temperature Rising Elution Fractionation ("TREF"), wherein the fraction has a block index greater than about 0.3 and up to about 1.0 and the ethylene/α-olefin interpolymer has a molecular weight distribution, Mw/Mn, greater than about 1.4.
INTERNATIONAL SEARCH REPORT

A CLASSIFICATION OF SUBJECT MATTER

INV. C08L23/00 C08F297/08 C08F2/36

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 database consulted during the international search (name of database and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<td>X</td>
<td>WO 2008/030953 A (DOW GLOBAL TECHNOLOGIES INC [US]; POON BENJAMIN C [US]; CHEN HONGYU [U]) 13 March 2008 (2008-03-13) claims; examples 3-7,10-19</td>
<td>1,2, 4-11,13</td>
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Further documents are listed in the continuation of Box C

X See patent family annex

* Special categories of cited documents

1A' document defining the general state of the art which is not considered to be of particular relevance

1E' earlier document but published on or after the international filing date

1L' 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)

1O' document referring to an oral disclosure, use, exhibition or other means

1P' document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search
10 February 2010

Date of mailing of the international search report
03/05/2010

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
Iraegui Retolaza, E
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).

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 fees, this Authority did not invite payment of additional fees.

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.:

   see additional sheet

Remark on Protest

The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2, 4 to 11 and 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8, a 

\[ T_m = -6553.3 + 13735(d) - 7051.7(d)^2 \]

wherein the ethylene/alpha-olef in block interpolymer is mesophase separated according to claims 1 and 2, 4 to 11 and 13 (as far as dependent on claim 1).

2. claims: 1, 2, 4 to 11 and 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8 and a heat of fusion

\[ \Delta H = 0.1299(\Delta H) + 62.81 \]

for \( \Delta H \) greater than zero and up to 130J/g, \( \Delta H > 48^\circ C \) for \( \Delta H \) greater than 130J/g and wherein the ethylene/alpha-olef in block interpolymer is mesophase separated according to claims 1 and 2, 4 to 11 and 13 (as far as dependent on claim 1).

3. claims: 1, 2, 4 to 11 and 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8, an elastic recovery

\[ R_e > 148181 - 1629(d) \]

and wherein the ethylene/alpha-olef in block interpolymer is mesophase separated according to claims 1 and 2, 4 to 11 and 13 (as far as dependent on claim 1).

4. claims: 1, 2, 4 to 11 and 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8, has a molecular fraction which elutes between 40°C and 130°C and wherein the ethylene/alpha-olef in block interpolymer is mesophase separated according to claims 1 and 2, 4 to 11 and 13 (as far as dependent on claim 1).
5. claims: 1, 2, 4 to 11 and 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8, a storage modulus at 25°C \( G'(25^\circ C) \) and a storage modulus at 100°C \( G'(100^\circ C) \) wherein the ratio \( G'(25^\circ C) \) to \( G'(100^\circ C) \) is in the range of about 1:1 to about 9:1 and wherein the ethylene/alpha-olefin in block interpolymer is mesophase separated according to claims 1 and 2, 4 to 11 and 13 (as far as dependent on claim 1).

6. claims: 1, 2, 4 to 11 and 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8 and an average block index greater than zero and up to about 1.0 and wherein the ethylene/alpha-olefin in block interpolymer is mesophase separated according to claims 1 and 2, 4 to 11 and 13 (as far as dependent on claim 1).

7. claims: 3, 4 to 11 and 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8 and an average molecular weight greater than 40,000 and a difference in mole percent alpha-olefin content between the soft block and the hard block of greater than about 18.5 mole percent according to claims 3 and 4 to 11 and 13 (as far as dependent on claim 3).

8. claims: 12, 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8, a Tm\( >6553.3+13735(d) -7051.7(d)2 \) and is characterized by I10/I2>8 according to claims 12 and 13 (as far as dependent on claim 12).

9. claims: 12, 13 (each claim has been searched partially)
A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8 and a heat of fusion deltaH=-0.1299(deltaH)+62.81 for deltaH greater than zero and up to 130J/g and deltaH>=48°C for deltaH greater than 130J/g and is characterized by I10/I2>8 according to claims 12 and 13 (as far as dependent on claim 12).

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10. claims: 12, 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8, an elastic recovery Re>148181-1629(d) and is characterized by I10/I2>8 according to claims 12 and 13 (as far as dependent on claim 12).

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11. claims: 12, 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8, has a molecular fraction which elutes between 40°C and 130°C and is characterized by I10/I2>8 according to claims 12 and 13 (as far as dependent on claim 12).

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12. claims: 12, 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8 and a storage modulus at 25°C G'(25°C) and a storage modulus at 100°C G'(100°C) wherein the ratio G'(25°C) to G'(100°C) is in the range of about 1:1 to about 9:1 and is characterized by I10/I2>8 according to claims 12 and 13 (as far as dependent on claim 12).

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13. claims: 12, 13 (each claim has been searched partially)

A composition comprising a thermoplastic polymer composition and an impact modifying amount of a block interpolymer characterized by a molecular weight distribution in the range from 1.4 to about 2.8 and an average block index greater than zero and up to about 1.0 and is characterized by I10/I2>8 according to claims 12 and 13 (as far as dependent on claim 12).
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