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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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:

23 December 2021 (23.12.2021)

(54) Title: LINEAR LOW DENSITY POLYETHYLENE FOR FILM APPLICATIONS

(57) Abstract: The present disclosure generally relates to catalyst systems, polyethylene compositions, and uses of such compositions in, e.g., films. In an embodiment is provided a film that includes a polyethylene composition, comprising: ethylene and a C₃-C₄₀ olefin comonomer, the polyethylene composition having at least 65 wt% ethylene content and from 0 wt% to 35 wt% of a C₃-C₄₀ olefin comonomer content based upon the total weight of the composition, the film having: an average of MD and TD 1% secant modulus of 43,000 psi or greater, and a Dart Drop Impact Strength of greater than 500 g/mil. In another embodiment is provided a process for producing a polyethylene composition that includes introducing ethylene and a C₃-C₄₀ alpha-olefin to a catalyst system, the catalyst system comprising a first catalyst compound, a second catalyst compound, and an activator; and forming a polyethylene composition.



INTERNATIONAL SEARCH REPORT

International application No

PCT/US2021/028825

A. CLASSIFICATION OF SUBJECT MATTER

INV. B29C49/00 C08F210/16 C08J5/18 C08L23/08
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)

B29C C08F C08J C08L

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 2019/027605 A1 (EXXONMOBIL CHEMICAL PATENTS INC [US]) 7 February 2019 (2019-02-07) table 6 -----	1-8
X	US 2019/119413 A1 (HOLTCAMP MATTHEW W [US] ET AL) 25 April 2019 (2019-04-25) table 7 -----	1-8
X	WO 2019/246069 A1 (EXXONMOBIL CHEMICAL PATENTS INC [US]) 26 December 2019 (2019-12-26) example Inv.A; table VI -----	1-8
A	US 2013/085221 A1 (BOTROS MAGED G [US] ET AL) 4 April 2013 (2013-04-04) example 1 ----- -/-	1-8



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

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26/11/2021

Name and mailing address of the ISA/

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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.
A	WO 2010/034461 A1 (BASELL POLYOLEFINE GMBH [DE]; FANTINEL FABIANA [DE] ET AL.) 1 April 2010 (2010-04-01) the whole document -----	1-8
A	US 2018/237558 A1 (MCCULLOUGH LAUGHLIN G [US]) 23 August 2018 (2018-08-23) the whole document -----	1-8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2021/028825

Box No. 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 No. 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 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.:

1-8

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-8

A film according to claim 1

2. claims: 9-16

A process for producing a polyethylene composition according to claim 9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2021/028825

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2019027605 A1	07-02-2019	CN 111491959 A EP 3661984 A1 US 2020165366 A1 WO 2019027605 A1	04-08-2020 10-06-2020 28-05-2020 07-02-2019
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