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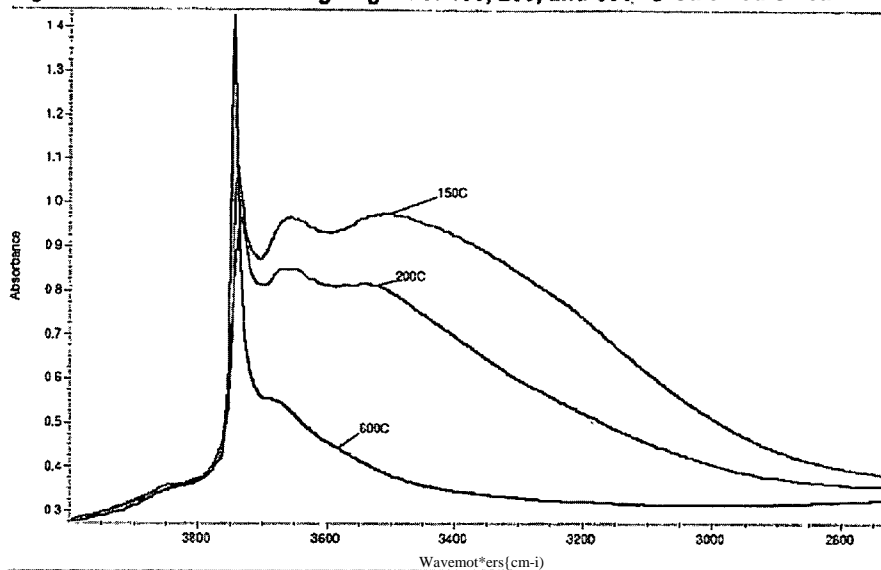
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*C08F 10/00* (2006.01)      *C08F 4/659* (2006.01)      [US/US]; 1457 Bullrush Drive, Baton Rouge, LA 70810 (US).
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- (71) **Applicant (for all designated States except US):** ALBEMARLE CORPORATION [US/US]; 451 Florida Street, Baton Rouge, LA 70801-1765 (US).
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- (74) **Agents:** HOEFLING, Marcy, M. et al; Albemarle Corporation, 451 Florida Street, Baton Rouge, LA 70801-1765 (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, FT, 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
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[Continued on next page]

(54) **Title:** CATALYST ACTIVATORS, PROCESSES FOR MAKING SAME, AND USE THEREOF IN CATALYSTS AND POLYMERIZATION OF OLEFINS

Figure 1. IR Proton Stretching Region of 150, 200, and 600 °C Calcined Silica



(57) **Abstract:** Compositions useful for activating catalysts for olefin polymerization are provided. The compositions are derived from at least: a) compound derived from at least (i) carrier having at least one pair of hydrogen bonded hydroxyl groups, (ii) organoaluminum compound, and (iii) Lewis base, such that each of a majority of aluminum atoms in the organoaluminum compound forms chemical bonds with at least two oxygen atoms from the at least one pair of hydrogen bonded hydroxyl groups; and b) Bronsted acid, wherein the molar ratio of the Bronsted acid to the organoaluminum compound is less than or equal to about 2:1.

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PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

**Declarations under Rule 4.17:**

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

**(88) Date of publication of the international search report:**

25 September 2008

# INTERNATIONAL SEARCH REPORT

International application No PCT/US2007/086397
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**A. CLASSIFICATION OF SUBJECT MATTER**  
**INV . C08F10/00 C08F4/659**

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 . CHEM ABS Data**

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document with indication, where appropriate, of the relevant passages	Relevant to claim No
<b>X</b>	WO 01/90112 A (BASELL POLYOLEFINE GMBH [DE]; SCHOTTEK JOERG [DE]) 29 November 2001 (2001-11-29) cited in the application	1-25
<b>Y</b>	page 66 - page 69 -----	14
<b>Y</b>	DATABASE CAPLUS [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; FUJITA, MASAYUKI ET AL: "Catalysts for polymerization of .alpha.-olefins and manufacture of .alpha.-olefin polymers" XP002385149 retrieved from STN Database accession no. 2001:842313 abstract & JP 2001 323009 A (SUMITOMO CHEMICAL CO., LTD., JAPAN) 20 November 2001 (2001-11-20) ----- -/--	14

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 document 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
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Date of the actual completion of the international search <b>16 May 2008</b>	Date of mailing of the international search report 28/07/2008
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Name and mailing address of the ISA/ 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  <b>Parry, Julian</b>
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2007/086397

(^Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	<p>DATABASE CAPLUS [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; ISHIHARA, NOBUHIDE ET AL: "Al uminoxane-contai ning polymeri zati on catalysts for olefins" XP002385148 retrieved from STN Database accession no. 1995:408683 abstract 6 JP 06 329714 A (IDEMITSU KOSAN CO, JAPAN) 29 November 1994 (1994-11-29)</p>	14
A	<p>STAPLETON R A ET AL: "BULKY ALUMINUM ALKYL SCAVENGERS IN OLEFIN POLYMERIZATION WITH GROUP 4 CATALYSTS" JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, AMERICAN CHEMICAL SOCIETY, WASHINGTON, DC, US, vol. 125, no. 31, 7 December 2003 (2003-12-07), pages 9246-9247, XP008063176 ISSN: 0002-7863 the whole document</p>	1-22
P,A	<p>WO 2007/005921 A (ALBEMARLE CORP [US]; LUO LUBIN [US]; DIEFENBACH STEVEN P [US]; MATHUR) 11 January 2007 (2007-01-11) paragraph [0135] paragraph [0151]</p>	1-22
P,A	<p>WO 2007/005676 A (ALBEMARLE CORP [US]; LUO LUBIN [US]; LEE JOHN Y [US]; DIEFENBACH STEVE) 11 January 2007 (2007-01-11) page 3, paragraph 14 - page 4, paragraph 15; figure 1</p>	1-22
P,X	<p>WO 2007/076398 A (ALBEMARLE CORP [US]; LUO LUBIN [US]; DIEFENBACH STEVEN P [US]; WANG ZH) 5 July 2007 (2007-07-05) page 49 - page 51</p>	1-22

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2007/086397

## 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 allsearchable 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 - 22 (in part)

### 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.

**D** No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM POT/ISA/ 210

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

1. claims: 1-22 (in part)

The subject matter of claims 1-22 (in part) excluding the subject matter of inventions 2 and 3

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2. claim: 23 (in part)

The subject matter of claim 23 (in part) excluding the subject matter of Invention 3

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3. claims: 24-25 (in part)

The subject matter of claims 24-25 (in part) excluding the subject matter of invention 2

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2007/086397
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Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
WO 0190112	<b>A</b>	29-11-2001	<b>AT</b> 258178 <b>T</b>	15-02--2004
			<b>AU</b> 6599701 <b>A</b>	03-12--2001
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WO 2007005676	<b>A</b>	11-01-2007	<b>NONE</b>	
WO 2007076398	<b>A</b>	05-07-2007	<b>NONE</b>	