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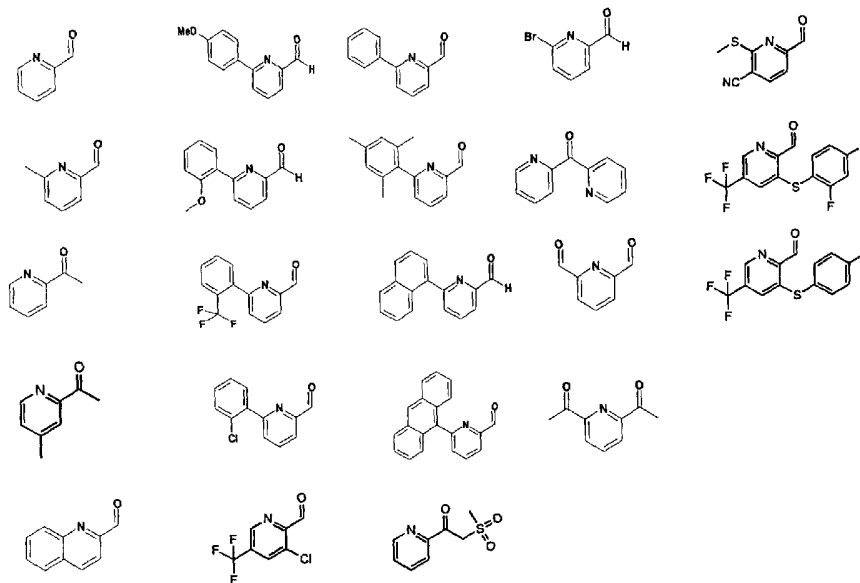
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3100 Central Expressway, Santa Clara, CA 95051 (US).(72) Inventors: BOUSSIE, Thomas, R.; 916 Laurel Avenue,
Menlo Park, CA 94025 (US). DIAMOND, Gary, M.; 90
S. 13th Street, Apt. 1, San Jose, CA 95112 (US). GOH,
Christopher; 629 Lakeview Avenue, San Francisco, CA94112 (US). HALL, Keith, A.; 2946 Rosemary Lane,
San Jose, CA 95128 (US). POINTE, Anne, M. La; 475
Wilson Avenue, Sunnyvale, CA 94086 (US). LECLERC,
Margarete, K.; 588 Cambridge Drive, Santa Clara, CA
95051 (US). LUND, Cheryl; 1410 Cuciz Lane, Milpitas,
CA 95035 (US). MURPHY, Vince; 423 E. Latimer
Avenue, #1, Campbell, CA 95008 (US).(74) Agent: RONALD, A., Krasnow; Symyx Technologies,
Inc., 3100 Central Expressway, Santa Clara, CA 95051
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[Continued on next page]

(54) Title: METHODS OF COPOLYMERIZING ETHYLENE AND ISOBUTYLENE AND POLYMERS MADE THEREBY



(57) Abstract: New ligands, compositions, metal-ligand complexes and arrays with pyridylamine ligands are disclosed that catalyze the polymerization of monomers into polymers. Certain of these catalysts with hafnium metal centers have high performance characteristics, including higher comonomer incorporation into ethylene/olefin copolymers, where such olefins are for example, 1-octene, isobutylene or styrene. Certain of the catalysts are particularly effective at polymerizing propylene to high molecular weight isotactic polypropylene in a solution process at a variety of polymerization conditions.



IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

In national Application NoPCT/US 01/44147

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C08F10/00 C08F4/64 C07D213/16

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)

IPC 7 C08F C07F

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)

EP0-Internal, CHEM ABS Data, PAJ, 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 99 01460 A (UNION CARBIDE CHEM PLASTIC) 14 January 1999 (1999-01-14) page 30, paragraph 4 -page 31, line 1 page 32 -page 53; examples 1-17; tables 1-6 claims 2-9	1-9
X	EP 0 889 061 A (UNION CARBIDE CHEM PLASTIC) 7 January 1999 (1999-01-07) page 4 page 6, line 57 - line 58 page 6, line 54 -page 7, line 4 page 7 -page 9; examples 2,4; table 2 claim 3 --- -/--	1-9

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"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

28 June 2002

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04.10.2002

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

Parry, J

INTERNATIONAL SEARCH REPORT

Int'l 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.
X	WO 00 37511 A (UNIVATION TECH LLC) 29 June 2000 (2000-06-29) page 32 -page 51; claim 18; examples 1-16 claim 27 -----	1-9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/44147

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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.:

1-9

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: 1-9

The subject matter of claims 1-9

2. Claims: 10-11

The subject matter of claims 10-11

3. Claim : 12

The subject matter of claim 12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/44147

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