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D01D 5/40 (2006.01)

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, 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,

[Continued on next page]

(54) Title: HIGH TEMPERATURE MELT INTEGRITY BATTERY SEPARATORS VIA SPINNING

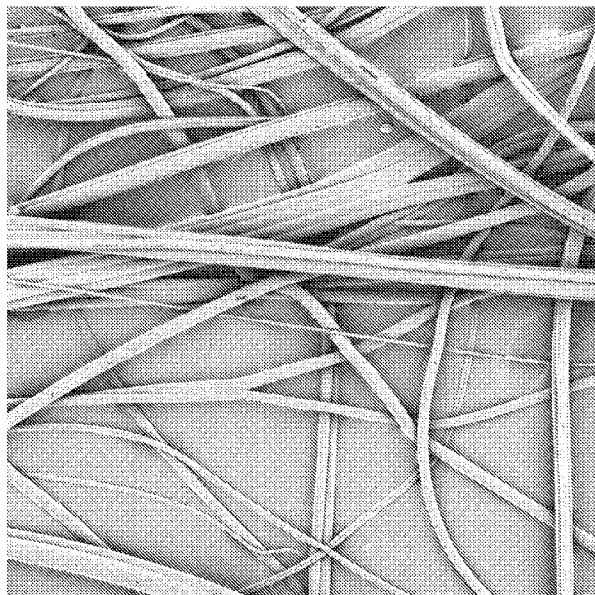


FIG. 13A

(57) Abstract: A method for preparing a high temperature melt integrity separator, the method comprising spinning a polymer by one or more of a mechanical spinning process and an electro-spinning process to produce fine fibers.



OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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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:

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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. D01D5/00 D01D5/06 D01D5/18 D01D5/40 H01M2/14
H01M2/16
ADD. D01F6/74

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)

D01D D01F H01M

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 2009/079523 A2 (DU PONT [US]; HUANG TAO [US]) 25 June 2009 (2009-06-25) page 1, line 10 - line 13 page 2, line 1 - line 15 page 3, line 26 - page 5, line 2 page 6, line 22 - page 7, line 14 examples claims ----- -/--	1-3,9, 10, 14-21, 25-33



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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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/076187

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 2008/004712 A2 (MATSUSHITA ELECTRIC IND CO LTD [JP]; TAKAHASHI MITSUHIRO) 10 January 2008 (2008-01-10) page 6, line 17 - page 7, line 2 page 11, line 15 - line 20 page 20, line 24 - page 22, line 7 page 39, line 23 - page 40, line 8 -----	1-3,9, 10, 14-21, 25-33
X	WO 2010/014986 A2 (DU PONT [US]; JONES DAVID CHARLES [US]; LIM HYUN SUNG [US]) 4 February 2010 (2010-02-04) claims -----	1-10, 14-17, 19-21, 25-33
X	GB 1 552 313 A (BASF AG) 12 September 1979 (1979-09-12) page 1, line 6 - line 9 page 1, line 28 - line 31 page 1, line 36 - page 2, line 11 examples -----	1-3,9, 11-16, 22-33
X	JP 2007 211378 A (MITSUI CHEMICALS INC) 23 August 2007 (2007-08-23) cited in the application abstract examples -----	4,5,16, 25-33
X	JP 2007 039840 A (TORAY INDUSTRIES) 15 February 2007 (2007-02-15) abstract examples -----	4,5,16, 22-33
X	JP H05 230712 A (TORAY INDUSTRIES) 7 September 1993 (1993-09-07) abstract example -----	4,5,16, 25-33
X	WO 2008/018657 A1 (KOREA INST SCI & TECH [KR]; JO SEONG-MU [KR]; KIM DONG-YOUNG [KR]; CHI) 14 February 2008 (2008-02-14) cited in the application example 4 page 27, line 1 - line 14 claims -----	17-33
X	US 2011/180972 A1 (LEE JAE ROCK [KR] ET AL) 28 July 2011 (2011-07-28) paragraph [0005] examples claims -----	17-33
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/076187

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 911 864 A1 (TOYO BOSEKI [JP]) 16 April 2008 (2008-04-16) paragraph [0001] paragraph [0042] examples claims	17-21, 25-33
X	----- US 2011/236744 A1 (KIM SUN OK [KR] ET AL) 29 September 2011 (2011-09-29) paragraph [0018] - paragraph [0023] paragraph [0055] - paragraph [0058] paragraph [0071] - paragraph [0076] claims 9-14 -----	17, 19-21, 25-33

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/076187

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.:

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: 1-3(completely); 6-16, 22-33(partially)

Production of fine fibres by mechanical spinning of a polymer solution

2. claims: 4, 5(completely); 6-16, 22-33(partially)

Production of fine fibres by mechanical spinning of a polymer melt

3. claims: 17-21(completely); 22-33(partially)

Production of fine fibres by electrostatic spinning of a polymer solution

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/076187

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