



(51) International Patent Classification:

C08L 77/02 (2006.01) *C08K 5/5313* (2006.01)
C08K 7/02 (2006.01) *C08J 5/00* (2006.01)
C08K 3/38 (2006.01)

(21) International Application Number:

PCT/US2012/046509

(22) International Filing Date:

12 July 2012 (12.07.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/508,118 15 July 2011 (15.07.2011) US

(71) Applicant (for all designated States except US): **POLY-ONE CORPORATION** [US/US]; 33587 Walker Road, Avon Lake, Ohio 44012 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CHEN, Haiyan** [CN/CN]; Lane #48 Pudian Road, Room #502, Building #16, Shanghai 200122 (CN). **LIM, Ching Lee Joseph** [SG/SG]; 80A Lorong 4, Toa Payoh #10-454, 311080 (SG). **FONG, Lai Chang** [SG/SG]; 37 Jurong East Avenue 1, #14-05, 609775 (SG).

(74) Agents: **HORNICKEL, JOHN H.** et al.; Polyone Corporation, 33587 Walker Road, Avon Lake, Ohio 44012 (US).

(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, 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, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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))
- of inventorship (Rule 4.17(iv))

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:

2 May 2013

(54) Title: POLYAMIDE COMPOUNDS CONTAINING PITCH CARBON FIBER

(57) Abstract: A thermally conductive polyamide compound is disclosed. The compound comprises a polyamide matrix with pitch-based carbon fiber, boron nitride, and organophosphinate flame retardant dispersed in the matrix. The compound can be extruded or molded into a heat dissipating article.



WO 2013/012685 A3

A. CLASSIFICATION OF SUBJECT MATTER*C08L 77/02(2006.01)i, C08K 7/02(2006.01)i, C08K 3/38(2006.01)i, C08K 5/5313(2006.01)i, C08J 5/00(2006.01)i*

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)

C08L 77/02; C08K 3/00; C07F 9/32; B05D 3/02; B32B 27/04; C08L 101/00; B32B 11/04; B32B 9/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: polyamide, pitch, carbon fiber, boron nitride, phosphinate, retardant.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2010-024343 A (TEIJIN LTD.) 04 February 2010 See claims 1, 5, 6, 7, 10; paragraphs [0048], [0063-0082].	1-3, 10-12
Y	KR 10-0654525 B1 (CHEIL INDUSTRIES, INC.) 05 December 2006 See claims 1, 6, 13.	1-3, 10-12
A	US 2009-0004393 A1 (RODGERS STEVEN R.) 01 January 2009 See claims 15, 19, 32.	1-3, 10-12
A	US 2009-0061193 A1 (HARA HIROSHI et al.) 05 March 2009 See claims 1, 5; paragraphs [0005], [0085].	1-3, 10-12

 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 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

25 FEBRUARY 2013 (25.02.2013)

Date of mailing of the international search report

26 FEBRUARY 2013 (26.02.2013)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, JAE MIN

Telephone No. 82-42-481-8146



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.: 4-9
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:

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.:

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/046509

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2010-024343 A	04.02.2010	None	
KR 10-0654525 B1	05.12.2006	CN 101351468 A EP 1968989 A1 JP 2009-522252 A TW 200838869 A US 2007-0155872 A1 US 7939588 B2 WO 2007-078028 A1	21.01.2009 17.09.2008 11.06.2009 01.10.2008 05.07.2007 10.05.2011 12.07.2007
US 2009-0004393 A1	01.01.2009	WO 2009-006163 A2 WO 2009-006163 A3	08.01.2009 12.03.2009
US 2009-0061193 A1	05.03.2009	CN 101163828 A0 EP 1876276 A1 JP 4576430 B2 KR 10-2007-0121773 A WO 2006-112516 A1	16.04.2008 09.01.2008 10.11.2010 27.12.2007 26.10.2006