

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 October 2009 (22.10.2009)

PCT

(10) International Publication Number
WO 2009/129380 A3

(51) International Patent Classification:

C23C 28/00 (2006.01) C23C 30/00 (2006.01)
C23C 22/05 (2006.01)

(21) International Application Number:

PCT/US2009/040791

(22) International Filing Date:

16 April 2009 (16.04.2009)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/045,593 16 April 2008 (16.04.2008) US
61/045,921 17 April 2008 (17.04.2008) US

(71) Applicant (for all designated States except US): **C-3 INT'L, LLC** [US/US]; 1370 Union Hill Industrial Court, Alpharetta, GA 30004 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DEININGER, Mark, A.** [US/US]; 675 Springview Court, Roswell, GA 30076 (US). **BUDARAGIN, Leonid, V.** [RU/RU]; Andropov Avenue 32/37, Apartment 83, Moscow, 115487 (RU). **POZVONKOV, Mikhail** [US/US]; 3750 Deauville Way, Cumming, GA 30041 (US).

(74) Agents: **PRATT, John** et al.; 1100 Peachtree Street NE, Suite 2800, Atlanta, GA 30309 (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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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:

14 January 2010

(54) Title: METHODS FOR ENHANCING LUBRICITY OF SURFACES

(57) Abstract: The invention relates to methods for enhancing the lubricity of a surface by forming at least one metal oxide on the surface. In some embodiments, the metal oxide enhances the lubricity, and in other embodiments, the metal oxide works with another lubricant to further enhance lubricity. The wear rate of a metal surface is reduced dramatically when at least one metal oxide is formed on the surface, in some embodiments.



WO 2009/129380 A3

A. CLASSIFICATION OF SUBJECT MATTER*C23C 28/00(2006.01)i, C23C 22/05(2006.01)i, C23C 30/00(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)

IPC C23C

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 since 1975

Japanese utility models and applications for utility models since 1975

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

eKOMPASS(KIPO internal)

Keywords: lubricity, metal, oxide, surface

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2004-084002 A (ISHIZUKA GLASS CO., LTD.) 18 March 2004 See abstract, pages 3 and 4, and all claims	1,4-7,9,11,13,15,17,19, 21,25
Y		2,3
Y	JP 2006-022363 A (NIPPON STEEL CO., LTD.) 26 January 2006 See abstract, pages 4 and 5, and all claims	2,3
A	JP 2003-105565 A (TOSHIBA TUNGALOY CO., LTD.) 09 April 2003 See abstract and all claims	1-25
A	JP 2004-323913 A (NIPPON PARKERIZING CO., LTD.) 18 November 2004 See abstract, all claims, and all figures	1-25

 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

27 NOVEMBER 2009 (27.11.2009)

Date of mailing of the international search report

27 NOVEMBER 2009 (27.11.2009)

Name and mailing address of the ISA/KR


 Korean Intellectual Property Office
 Government Complex-Daejeon, 139 Seonsa-ro, Seo-
 gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

PARK, JAE WOO

Telephone No. 82-42-481-5516



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/040791Patent document
cited in search reportPublication
datePatent family
member(s)Publication
date

JP 2004-084002 A

18.03.2004

None

JP 2006-022363 A

26.01.2006

None

JP 2003-105565 A

09.04.2003

None

JP 2004-323913 A

18.11.2004

None