

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
30 August 2007 (30.08.2007)

PCT

(10) International Publication Number
WO 2007/096485 A3

- (51) **International Patent Classification:**
B23K 26/06 (2006.01) *C23C 14/28* (2006.01)
- (21) **International Application Number:**
PCT/FI2007/050106
- (22) **International Filing Date:**
23 February 2007 (23.02.2007)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
- | | | |
|----------|-------------------------------|----|
| 20060177 | 23 February 2006 (23.02.2006) | FI |
| 20060178 | 23 February 2006 (23.02.2006) | FI |
| 20060181 | 23 February 2006 (23.02.2006) | FI |
| 20060182 | 23 February 2006 (23.02.2006) | FI |
| 20060357 | 12 April 2006 (12.04.2006) | FI |

(81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, 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, LV, LY, MA, MD, 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.

(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, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, 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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Declaration under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

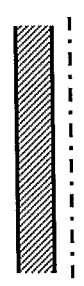
(88) Date of publication of the international search report:

11 October 2007

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.

(54) **Title:** COATING ON A METAL SUBSTRATE AND A COATED METAL PRODUCT

Metal panel



(57) **Abstract:** The invention relates in general level to a method for coating metal products comprising large surface areas. The invention also relates to coat metal products manufactured by the method. The coating is carried out by employing ultra short pulsed laser deposition wherein pulsed laser beam is scanned with a rotating optical scanner comprising at least one mirror for reflecting said laser beam. The invention has several both industrially and qualitatively advantageous effects such as high coating production rate, excellent coating properties and overall low manufacturing costs.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2007/050106

A. CLASSIFICATION OF SUBJECT MATTER
INV. B23K26/06 C23C14/28

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)
B23K C23C

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KONOV V I ET AL: "Pulsed laser deposition of hard coatings in atmospheric air" APPLIED PHYSICS A: MATERIALS SCIENCE AND PROCESSING, SPRINGER VERLAG, BERLIN, DE, vol. 79, 2004, pages 931-936, XP007902699 ISSN: 0947-8396 the whole document	1-4,7, 12-15, 17-22, 27-29, 31-33
Y	US 5 948 172 A (NEIHEISEL GARY L [US]) 7 September 1999 (1999-09-07) column 11, line 37 - column 12, line 36; figures 10A,10B ----- -/--	1,20

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- *&* document member of the same patent family

Date of the actual completion of the international search

27 July 2007

Date of mailing of the international search report

03/08/2007

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INTERNATIONAL SEARCH REPORT

International application No

PCT/FI2007/050106

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005/036190 A1 (TANAKA KOICHIRO [JP]) 17 February 2005 (2005-02-17) paragraph [0017] - paragraph [0018]; figures 2,4A,4B,8A,8B -----	1-4,7, 12-15, 17-22, 27-29, 31-33
A	WO 99/59759 A (UNIV CALIFORNIA [US]) 25 November 1999 (1999-11-25) page 6, line 24 - page 9, line 6; figure 1 -----	2-4,13, 21,22,27
A	US 6 372 103 B1 (PERRY MICHAEL D [US] ET AL) 16 April 2002 (2002-04-16) column 7, line 17 - column 8, line 31; figures 12,14,17 -----	14,15, 18,19, 28-30

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2007/050106

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5948172	A	07-09-1999	AT 215417 T	15-04-2002
			AU 4924997 A	15-07-1999
			BR 9800348 A	16-11-1999
			CA 2225507 A1	22-06-1999
			CN 1224644 A	04-08-1999
			DE 69711652 D1	08-05-2002
			DE 69711652 T2	21-11-2002
			EP 0927595 A1	07-07-1999
			ES 2172740 T3	01-10-2002
			JP 11262449 A	28-09-1999
			US 5736709 A	07-04-1998
US 2005036190	A1	17-02-2005	CN 1540715 A	27-10-2004
WO 9959759	A	25-11-1999	AU 4308999 A	06-12-1999
			US 6120857 A	19-09-2000
			US 7118630 B1	10-10-2006
US 6372103	B1	16-04-2002	AU 6431199 A	01-05-2000
			WO 0022184 A1	20-04-2000