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(71) Applicant (for all designated States except US): **PRAX-AIR TECHNOLOGY, INC.** [US/US]; 39 Old Ridgebury Road, Danbury, CT 06810 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DICKINSON, Graeme** [US/US]; 4950 N. Miller Road #236, Scottsdale, AZ 85251 (US). **SIRMAN, John** [GB/US]; 46 Hickory Lane, Bethlehem, CT 06751 (US). **ASHARY, Adil** [US/US]; 6699 E. Stonegate Drive, Zionsville, IN 46077 (US). **PETORAK, Christopher** [US/US]; 3935 S. Illinois Street, Chandler, AZ 85248 (US). **MCDILL, Neill, Jean** [US/US]; 13210 North 50th Street, Scottsdale, AZ 85254 (US).

(74) Agents: **SCHWARTZ, Iurie, A.** et al.; Praxair, Inc., 39 Old Ridgebury Road, Danbury, CT 06810 (US).

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- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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(54) Title: THERMAL SPRAY COATINGS FOR SEMICONDUCTOR APPLICATIONS

(57) Abstract: This invention relates to thermal spray coatings on a metal or non-metal substrate. The thermal spray coating comprises a partially or fully stabilized ceramic coating, e.g., yttria stabilized zirconia coating, and has sufficiently high thermodynamic phase stability to provide corrosion and/or erosion resistance to the substrate. This invention also relates to methods of protecting metal and non-metal substrates by applying the thermal spray coatings. The coatings are useful, for example, in the protection of integrated circuit manufacturing equipment, internal chamber components, and electrostatic chuck manufacture.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

INV. C23C4/08 C23C4/10 C23C4/12 C23C24/08 C23C14/56
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ADD.

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)

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)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 310 466 A2 (TOSOH CORP [JP]) 14 May 2003 (2003-05-14) page 3, paragraph 9 page 4, paragraph 13 - page 5, paragraph 21 page 6, paragraph 33 - paragraph 37 page 7, paragraph 45 page 8, paragraph 55 - paragraph 60; claims 1-4,9-10,16-19 -----	1-25
X	US 2008/264565 A1 (SUN JENNIFER Y [US] ET AL) 30 October 2008 (2008-10-30) page 1, paragraph 3 - page 3, paragraph 21 page 4, paragraph 40 page 8, paragraph 56 - page 10, paragraph 65; claims 10-35; table 4 ----- -/--	1-25

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Ovejero, Elena

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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	US 2008/213496 A1 (SUN JENNIFER Y [US] ET AL) 4 September 2008 (2008-09-04)	1-5, 7-14, 17-24
A	page 1, paragraph 10 - page 3, paragraph 28 page 5, paragraph 47 - paragraph 50 page 9, paragraph 80; claims 1-5,15; figure 5	6,15,16, 25
X	----- WO 02/054453 A1 (LAM RES CORP [US]; O'DONNELL ROBERT J [US]; CHANG CHRISTOPHER C [US];) 11 July 2002 (2002-07-11) claims 1-25 page 5, line 1 - page 9, line 19 page 12, line 16 - page 14, line 28 -----	1-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1310466	A2	14-05-2003	KR 20030040115 A	22-05-2003
			TW 262905 B	01-10-2006
			US 2003091835 A1	15-05-2003
US 2008264565	A1	30-10-2008	NONE	
US 2008213496	A1	04-09-2008	WO 2009017766 A1	05-02-2009
WO 02054453	A1	11-07-2002	AT 454710 T	15-01-2010
			CN 1489779 A	14-04-2004
			EP 1356501 A2	29-10-2003
			JP 4331479 B2	16-09-2009
			JP 2004526053 T	26-08-2004
			TW 548737 B	21-08-2003
			US 2004023047 A1	05-02-2004
			US 2002086153 A1	04-07-2002