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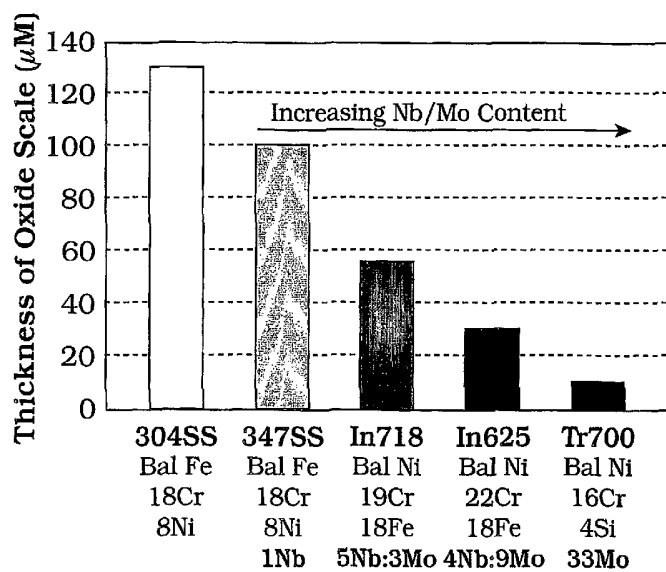
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[Continued on next page]

(54) Title: ADVANCED EROSION RESISTANT CARBIDE CERMETS WITH SUPERIOR HIGH TEMPERATURE CORROSION RESISTANCE



Selected Alloyed Binders Used in TiC Cermets

(57) Abstract: Cermets are provided in which a substantially stoichiometric metal carbide ceramic phase along with a reprecipitated metal carbide phase, represented by the formula M_xC_y , is dispersed in a metal binder phase. In M_xC_y , M is Cr, Fe, Ni, Co, Si, Ti, Zr, Hf, V, Nb, Ta, Mo or mixtures thereof, x and y are whole or fractional numerical values with x ranging from 1 to 30 and y from 1 to 6. These cermets are particularly useful in protecting surfaces from erosion and corrosion at high temperatures.



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, IT, LU, 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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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/015557

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C22C29/10

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 7 C22C

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, INSPEC, COMPENDEX, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 4 019 874 A (MOSKOWITZ ET AL) 26 April 1977 (1977-04-26) abstract column 1, line 6 - line 14 column 2, line 47 - column 3, line 13 column 3, line 45 - column 4, line 17 claims 1-4,7; figure 1	1-4,7, 9-11
X	FR 985 120 A (METALLWERK PLANSEE G.M.B.H) 16 July 1951 (1951-07-16) page 1, right-hand column, paragraph 2 page 2, left-hand column, paragraph 1 - right-hand column, paragraph 1 claims	1-4,10, 11
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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 document 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
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- *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.
- *Z* document member of the same patent family

Date of the actual completion of the international search

8 February 2005

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/015557

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 13, 30 November 1998 (1998-11-30) -& JP 10 219384 A (KUROSAKI REFRACT CO LTD), 18 August 1998 (1998-08-18) abstract paragraph '0014! - paragraph '0016!; tables 1-3 -----	1-4,10, 11
X	US 5 358 545 A (NAGRO ET AL) 25 October 1994 (1994-10-25) abstract column 1, line 58 - column 3, line 46 claims -----	1-5,10, 11
X	WO 02/053316 A (VALTION TEKNILLINEN TUTKIMUSKESKUS; LINTUNEN, PERTTI; LINTULA, PEKKA;) 11 July 2002 (2002-07-11) page 1, line 1 - line 12 page 1, line 30 - page 2, line 26 page 3, line 1 - page 4, line 15 claims; examples -----	1-11
A	PETROC A P ET AL: "MECHANISM OF STRUCTURE FORMATION IN SINTERING HARD ALLOYS BASED ON ALLOYED TITANIUM CARBIDE" METAL SCIENCE AND HEAT TREATMENT, CONSULTANTS BUREAU. NEW YORK, US, vol. 38, no. 7/8, July 1996 (1996-07), pages 303-305, XP000731702 ISSN: 0026-0673 the whole document -----	1-11

INTERNATIONAL SEARCH REPORT

ational application No.
PCT/US2004/015557

Box 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:
see FURTHER INFORMATION sheet PCT/ISA/210

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 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.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: -

Claim 1 relates to a cermet material containing a carbide based ceramic phase. The broad scope of possible ceramic materials denoted as "P" materials and mixtures thereof leads to a vast number of potential alloy combinations satisfying the criteria in claim 1. There is no evidence within the description to support the numerous combinations, indeed the only examples given in the description are for cermet material that contains TiC and TaC as the ceramic reinforcing phase. Thus the broad range of subject-matter defined in claim 1 lacks support from the description contrary to Art.6 PCT. Accordingly, the search and this report have been restricted to the use of TiC and TaC respectively as the ceramic phase.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/015557

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