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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))

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))

[Continued on next page]

(54) Title: COMPLIANT LAYER FOR CERAMIC COMPONENTS AND METHODS OF FORMING THE SAME

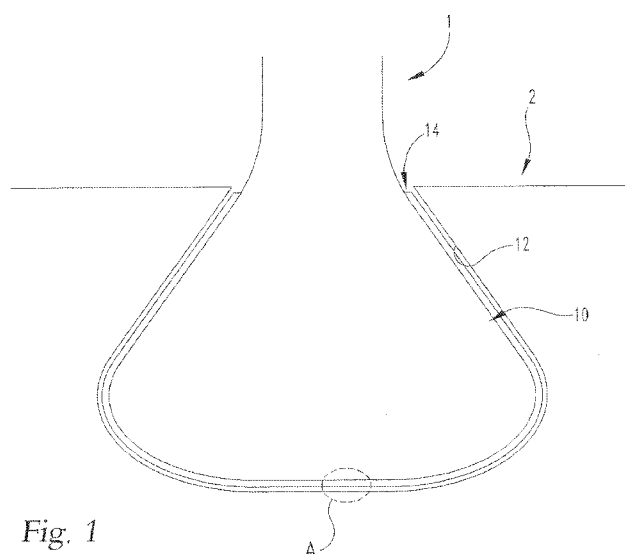


Fig. 1

(57) Abstract: An apparatus includes a ceramic matrix composite (CMC) component and an interface coating on the CMC component, wherein the interface coating includes a layer of at least one of the following compositions: 100 wt% Ir; 90 - 95 wt% Ir, 5 - 10 wt% Co, 1 - 2 wt% Al, 1 - 2 wt% Si; 40 - 50 wt% Nb, 28 - 42 wt% Al, 4 - 15 wt% Cr, 1 - 2 wt% Si; 90 - 92 wt% Mo, 4 - 5 wt% Si, 4 - 5 wt% B; or 60 - 80 wt% V, 20 - 30 wt% Cr, 2 - 15 wt% Ti.



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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. C04B41/88 C04B41/90 F01D5/28
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)

C04B F01D

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 practicable, search terms used)

EPO-Internal, WPI Data, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2007 106644 A (CHUGOKU ELECTRIC POWER) 26 April 2007 (2007-04-26) paragraph [0001] - paragraph [0002] examples -----	1-11, 15-22

☐

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 another 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

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21/01/2015

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/023646

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.:
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:

see additional sheet

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 fees, this Authority did not invite payment of additional fees.
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.:

1-11, 15-22(all partially)

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-11, 15-22(all partially)

An apparatus comprising a ceramic matrix composite (CMC) component with an interface coating system thereon, a turbine engine component comprising the ceramic matrix composite component and a method for forming an interface coating on a ceramic matrix composite component, wherein the interface coating comprises a layer having a composition comprising at least 90 wt% Ir.

2. claims: 1-11, 15-22(all partially)

An apparatus comprising a ceramic matrix composite (CMC) component with an interface coating system thereon, a turbine engine component comprising the ceramic matrix composite component and a method for forming an interface coating on a ceramic matrix composite component, wherein the interface coating comprises a layer having the composition 40 - 50 wt% Nb, 28 - 42 wt% Al, 4 - 15 wt% Cr, 1 - 2 wt% Si.

3. claims: 1-11, 15-22(all partially)

An apparatus comprising a ceramic matrix composite (CMC) component with an interface coating system thereon, a turbine engine component comprising the ceramic matrix composite component and a method for forming an interface coating on a ceramic matrix composite component, wherein the interface coating comprises a layer having the composition 90 - 92 wt% Mo, 4 - 5 wt% Si, 4 - 5 wt% B.

4. claims: 1-11, 15-22(all partially)

An apparatus comprising a ceramic matrix composite (CMC) component with an interface coating system thereon, a turbine engine component comprising the ceramic matrix composite and a method for forming an interface coating on a ceramic matrix composite component, wherein the interface coating comprises a layer having the composition 60 - 80 wt% V, 20 - 30 wt% Cr, 2 - 15 wt% Ti.

5. claims: 12-14

A ceramic matrix composite (CMC) component with an interface coating thereon, wherein the interface coating comprises a layer of at least one of the compositions as defined in subjects I to IV, further comprising a bond coating, a corrosion-resistant coating and a compliance-enhancing coating as defined in claim 12.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/023646

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2007106644 A	26-04-2007	NONE	
