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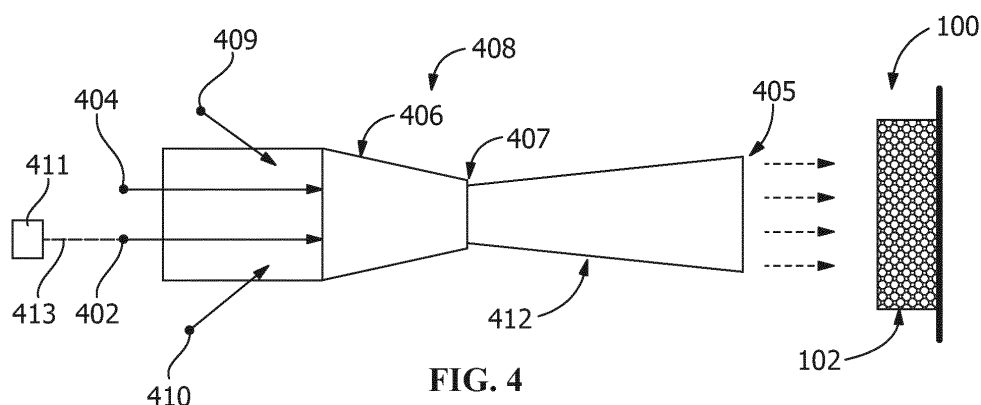
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(54) **Process of fabricating thermal barrier coatings**

(57) A process of fabricating a thermal barrier coating is disclosed. The process includes cold spraying a substrate (101) with a feedstock (402) to form a thermal barrier coating (102) and concurrently oxidizing one or more of the substrate (101), the feedstock (402), and the thermal barrier coating (102). The cold spraying is in a region (103) having an oxygen concentration of at least 10%. In another embodiment, the process includes heating a

feedstock (402) with a laser (411) and cold spraying a substrate (101) with the feedstock (402) to form a thermal barrier coating (102). At least a portion of the feedstock (402) is retained in the thermal barrier coating (102). In another embodiment, the process of fabricating a thermal barrier coating includes heating a substrate (101) with a laser (411) and cold spraying the substrate with a feedstock to form a thermal barrier coating.



**FIG. 4**



## EUROPEAN SEARCH REPORT

 Application Number  
 EP 14 15 8148

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2004/007787 A1 (SIEMENS AG [DE]; BIRKNER JENS [DE]; STAMM WERNER [DE]) 22 January 2004 (2004-01-22)	15	INV. C23C24/04
A	* page 3, lines 11-13 * * page 4, lines 21-24; figure 3 * * claim 6 *	1-13	
A	----- WO 02/061177 A2 (SIEMENS WESTINGHOUSE POWER [US]) 8 August 2002 (2002-08-08) * page 8, lines 3-22 *	1-13	
A	----- EP 2 072 634 A2 (UNITED TECHNOLOGIES CORP [US]) 24 June 2009 (2009-06-24) * paragraphs [0007], [0008], [0010], [0012], [0013], [0027]; claim 1 *	1-13	
A	----- OGAWA K ET AL: "Repair of Turbine Blades Using Cold Spray Technique", Advances in Gas Turbine Technology, vol. 21 4 November 2011 (2011-11-04), pages 499-526, XP055054794, InTech, Rijeka [HR] DOI: 10.5772/23623 ISBN: 978-9-53-307611-9 Retrieved from the Internet: URL:http://cdn.intechopen.com/pdfs/22913/InTech-Repair_of_turbine_blades_using_cold_spray_technique.pdf [retrieved on 2013-02-28] * figure 1 *	14	
			TECHNICAL FIELDS SEARCHED (IPC)
			C23C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 November 2014	Examiner Hoyer, Wolfgang
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)



## EUROPEAN SEARCH REPORT

Application Number  
EP 14 15 8148

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	CHRISTOULIS D K ET AL: "Laser-Assisted Cold Spray (LACS)" In: Dumitras D C: "Nd YAG Laser", 9 March 2012 (2012-03-09), InTech, Rijeka [HR], XP009178536, ISBN: 978-953-51-0105-5 vol. 5, pages 60-96, DOI: 10.5772/36104, * page 70; figures 7,8 * -----	15	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 November 2014	Examiner Hoyer, Wolfgang
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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Application Number

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number

EP 14 15 8148

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

**1. claims: 1-13**

A process of depositing a thermal barrier coating by cold spraying a substrate with a feedstock whilst concurrently oxidizing the substrate, the feedstock, and/or the thermal barrier coating, wherein the cold spraying is in a region having an oxygen concentration of at least 10 %.

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**2. claims: 14, 15**

A process of depositing a thermal barrier coating by cold spraying a substrate with a feedstock comprising heating the feedstock or the substrate with a laser.

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 15 8148

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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14-11-2014

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