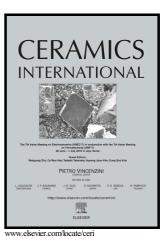
## Author's Accepted Manuscript

Effect of Substrate Temperature on Microstructure and Nanomechanical Properties of Gd<sub>2</sub>Zr<sub>2</sub>O<sub>7</sub> Coatings Prepared by EB-PVD Technique

S. Anandh Jesuraj, P. Kuppusami, T. Dharini, Padmalochan Panda, Deepa Devapal



 PII:
 S0272-8842(18)31749-8

 DOI:
 https://doi.org/10.1016/j.ceramint.2018.07.024

 Reference:
 CERI18746

To appear in: Ceramics International

Received date: 20 March 2018 Revised date: 13 June 2018 Accepted date: 3 July 2018

Cite this article as: S. Anandh Jesuraj, P. Kuppusami, T. Dharini, Padmalochan Panda and Deepa Devapal, Effect of Substrate Temperature on Microstructure and Nanomechanical Properties of  $Gd_2Zr_2O_7$  Coatings Prepared by EB-PVD T e c h n i q u e , *Ceramics International*, https://doi.org/10.1016/j.ceramint.2018.07.024

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

### ACCEPTED MANUSCRIPT

## Effect of Substrate Temperature on Microstructure and Nanomechanical Properties of Gd<sub>2</sub>Zr<sub>2</sub>O<sub>7</sub> Coatings Prepared by EB-PVD Technique

S. Anandh Jesuraj<sup>a</sup>, P. Kuppusami<sup>a,b\*</sup>, T. Dharini<sup>a</sup>, Padmalochan Panda<sup>c</sup>, Deepa Devapal<sup>d</sup>

<sup>a</sup>Centre for Nanoscience and Nanotechnology, Sathyabama Institute of Science and Technology, Chennai 600119, India

<sup>b</sup>Centre of Excellence for Energy Research, Sathyabama Institute of Science and Technology, Chennai 600119, India <sup>c</sup>Surface and Nanoscience Division, Indira Gandhi Centre for Atomic Research, Kalpakkam 603102, India.

<sup>d</sup>Ceramic Matrix Products Division, Analytical Spectroscopy and Ceramics Group, Vikram Sarabhai Space Centre, Thiruvananthapuram-695022

E-mail:pkigcar@gmail.com

#### Abstract

In the present work, gadolinium zirconate (Gd<sub>2</sub>Zr<sub>2</sub>O<sub>7</sub>) coatings have been developed on Inconel-718 substrates by electron beam physical vapor deposition (EB-PVD) technique. The structural, morphological and mechanical properties as a function of substrate temperature have been investigated by X-ray diffraction (XRD), scanning electron microscopy (SEM), atomic force microscopy (AFM), nanoindentation and scratch tests. XRD analysis revealed that the coatings showed cubic defect fluorite phase, and no secondary phase formation was observed in the coatings during deposition. The decrease in the lattice constant of the fluorite phase with increasing deposition temperature was explained on the basis of strain relaxation and vacancy concentration. Increased surface roughness of the coatings has been found with increasing substrate temperature as a result of increased crystallite size. An improved coating adhesion achieved for the coating deposited at higher substrate temperature of 973 K was confirmed by scratch test. Nanoindentation measurements indicated higher hardness (7.7 GPa) and resistance to plastic deformation and better capability to accommodate deformation energy for the coatings prepared at higher deposition temperature.

#### Keywords:

EB-PVD, Gadolinium zirconate, Substrate temperature, Morphology, Nanoindentation, TBCs.

Download English Version:

# https://daneshyari.com/en/article/8948499

Download Persian Version:

https://daneshyari.com/article/8948499

Daneshyari.com