## Accepted Manuscript

An analytical approach to the  $\beta$ -phase coarsening behaviour in a thermally sprayed CoNiCrAIY bond coat alloy

H. Chen, Y.Q. Si, D.G. McCartney

PII: S0925-8388(17)30417-6

DOI: 10.1016/j.jallcom.2017.02.002

Reference: JALCOM 40730

To appear in: Journal of Alloys and Compounds

Received Date: 16 September 2016

Revised Date: 22 January 2017

Accepted Date: 1 February 2017

Please cite this article as: H. Chen, Y.Q. Si, D.G. McCartney, An analytical approach to the  $\beta$ -phase coarsening behaviour in a thermally sprayed CoNiCrAIY bond coat alloy, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.02.002.

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 proof before it is published in its final 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 An analytical approach to the $\beta$ -phase coarsening behaviour in a thermally sprayed CoNiCrAlY bond coat alloy

H. Chen<sup>a,\*</sup>, Y. Q. Si<sup>a</sup> and D. G. McCartnev<sup>b</sup>

<sup>a</sup>Department of Mechanical, Materials and Manufacturing Engineering, Faculty of Science and Engineering, University of Nottingham Ningbo China, Ningbo 315100, China

<sup>b</sup>Advanced Materials Research Group, Faculty of Engineering, University of Nottingham, University Park, Nottingham NG7 2RD, UK

## Abstract

This paper investigates the  $\beta$ -phase coarsening behaviour during isothermal heat treatment of free-standing CoNiCrAlY (Co-31.7%Ni-20.8%Cr-8.1%Al-0.5%Y, all in wt%) coatings prepared by high velocity oxy-fuel (HVOF) thermal spraying. The microstructure of the coatings was characterised using scanning electron microscopy with energy dispersive X-ray (EDX) analysis and electron backscatter diffraction (EBSD). It comprises a two phase structure of fcc  $\gamma$ -Ni matrix and bcc  $\beta$ -NiAl precipitates. The volume fraction of the  $\gamma$ -Ni and the  $\beta$ -NiAl phases were measured to be around 70% and 30% respectively, with grain sizes varying largely from 0.5 to 2 µm for both phases. Isothermal heat treatments of the freestanding coatings were carried out at 1100 °C for times up to 250 h. The β-phase coarsening behaviour during isothermal heat treatments was analysed by quantitative metallography. It is shown that the coarsening behaviour of  $\beta$  phase in the CoNiCrAlY alloy followed the classical Lifshitz-Slyozov-Wagner (LSW) theory of Ostwald ripening. By incorporating a dimensionless factor which correlates with volume fraction of the  $\beta$  phase, a modified LSW model coupled with formulaic interfacial energy and effective diffusion coefficient of the Download English Version:

https://daneshyari.com/en/article/5460003

Download Persian Version:

https://daneshyari.com/article/5460003

Daneshyari.com