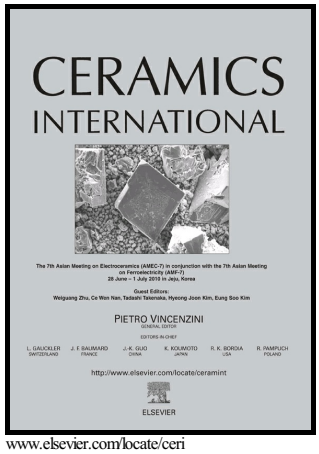

www.elsevier.com/locate/ceri

Experiments and transient finite element simulation of γ-$Y_2Si_2O_7$/ B_2O_3-Al_2O_3-SiO_2 glass coating on porous Si_3N_4 substrate under thermal shock

Xingyu Fan, Hongjie Wang, Min Niu, Dahai Zhang, Jun Zhou, Jinpeng Fan

PII: S0272-8842(17)32674-3
DOI: https://doi.org/10.1016/j.ceramint.2017.11.205
Reference: CERI16860

To appear in: *Ceramics International*

Received date: 17 October 2017
Revised date: 28 November 2017
Accepted date: 28 November 2017

Cite this article as: Xingyu Fan, Hongjie Wang, Min Niu, Dahai Zhang, Jun Zhou and Jinpeng Fan, Experiments and transient finite element simulation of γ-$Y_2Si_2O_7$/ B_2O_3-Al_2O_3-SiO_2 glass coating on porous Si_3N_4 substrate under thermal shock, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2017.11.205

Experiments and transient finite element simulation of γ-$Y_2Si_2O_7$/ B_2O_3-Al_2O_3-SiO_2 glass coating on porous Si_3N_4 substrate under thermal shock

Xingyu Fan [a], Hongjie Wang [a]*, Min Niu [a], Dahai Zhang [b]*, Jun Zhou [b], Jinpeng Fan [b]

[a] State Key Laboratory for Mechanical Behavior of Materialas, Xi'an Jiaotong University, Xi'an, Shannxi 710049, People's Republic of China

[b] Aerospace Research Institute of Material & Processing Technology, Beijing, 100076, People's Republic of China

*Corresponding author

Hongjie Wang. E-mail: hjwang@mail.xjtu.edu.cn; Fax: +86-029-82663453; Tel: +86-029-82667942

Dahai Zhang. E-mail: yrlzdh@sohu.com

Abstract

A dense γ-$Y_2Si_2O_7$ /B_2O_3-Al_2O_3-SiO_2 glass coating was fabricated by slurry spraying method on porous Si_3N_4 ceramic for water resistance. Thermal shock failure was recognized as one of the key failure modes for porous Si_3N_4 radome materials. In this paper, thermal shock resistance of the coated porous Si_3N_4 ceramics were investigated through rapid quenching thermal shock experiments and transient finite element analysis. Thermal shock resistance of the coating was tested at 700°C, 800°C, 900°C and 1000°C. Results showed that the cracks initiated within the coating after thermal