

Accepted Manuscript

High temperature wettability between CMAS and YSZ coating with tailored surface microstructures

Y.X. Kang, Y. Bai, G.Q. Du, F.L. Yu, C.G. Bao, Y.T. Wang, F. Ding

PII: S0167-577X(18)30971-6
DOI: <https://doi.org/10.1016/j.matlet.2018.06.066>
Reference: MLBLUE 24506

To appear in: *Materials Letters*

Received Date: 23 April 2018
Revised Date: 4 June 2018
Accepted Date: 18 June 2018

Please cite this article as: Y.X. Kang, Y. Bai, G.Q. Du, F.L. Yu, C.G. Bao, Y.T. Wang, F. Ding, High temperature wettability between CMAS and YSZ coating with tailored surface microstructures, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.06.066>

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.



High temperature wettability between CMAS and YSZ coating with tailored surface microstructures

Y.X. Kang^a, Y. Bai^{a,*}, G.Q. Du^b, F.L. Yu^{c,*}, C.G. Bao^a, Y.T. Wang^a, F. Ding^a

^aState Key Laboratory for Mechanical Behavior of Materials, Xi'an Jiaotong University, Xi'an, 710049,

China

^bState Key Laboratory for Manufacturing System Engineering and Key Laboratory of Photonics

Technology for Information of Shaanxi Province, Xi'an Jiaotong University, Xi'an, 710049, China

^cSchool of Materials Engineering, Xi'an Aeronautical University, Xi'an, 710077, PR China

Abstract: In the present work, the wetting behaviors of molten calcium-magnesium-aluminum-silicate (CMAS) on femtosecond laser ablated YSZ coatings are comparatively studied. The results suggest that femtosecond laser ablated coating possesses smaller initial contact angle compared with as-sprayed or polished YSZ coatings, but lower spreading rate and larger equilibrium contact angle. This difference can be attributed to: 1) restricted CMAS spreading by the ablated squares through pinning the solid-liquid-vapor triple-phase contact line; 2) retarded CMAS penetration by microrod-shaped structure inside the ablated squares. This study provides an effective method to improve the CMAS resistance of YSZ coating by femtosecond laser.

Keywords: Thermal barrier coating; Corrosion; Wetting; Femtosecond laser; Ceramics; Contact angle

1. Introduction

Degradation of yttria stabilized zirconia (YSZ) based thermal barrier coatings (TBCs) due to infiltration of calcium-magnesium-aluminum-silicate (CMAS) becomes more dominant in the increased in-service temperature of current aero engines. The molten CMAS that rapidly infiltrated into the TBCs through pores or gaps solidifies after the cooling of the engine, leading to high stress in TBCs. In addition,

*Corresponding author. Tel.: +86 29 82668614; fax: +86 29 82663453.

E-mail address: byxjtu@mail.xjtu.edu.cn (Y. Bai) yufangli0405@163.com (F.L. Yu)

Download English Version:

<https://daneshyari.com/en/article/8012397>

Download Persian Version:

<https://daneshyari.com/article/8012397>

[Daneshyari.com](https://daneshyari.com)