

Accepted Manuscript

Title: Effect of texture on oxidation resistance of Ti_3AlC_2

Authors: Ludi Xu, Degui Zhu, Yunlong Liu, Tohru S. Suzuki, Byung-nam Kim, Yoshio Sakka, Salvatore Grasso, Chunfeng Hu



PII: S0955-2219(18)30135-3
DOI: <https://doi.org/10.1016/j.jeurceramsoc.2018.03.009>
Reference: JECS 11766

To appear in: *Journal of the European Ceramic Society*

Received date: 15-1-2018
Revised date: 7-3-2018
Accepted date: 8-3-2018

Please cite this article as: Xu L, Zhu D, Liu Y, Suzuki TS, Kim B-n, Sakka Y, Grasso S, Hu C, Effect of texture on oxidation resistance of Ti_3AlC_2 , *Journal of The European Ceramic Society* (2010), <https://doi.org/10.1016/j.jeurceramsoc.2018.03.009>

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.

Effect of texture on oxidation resistance of Ti_3AlC_2

Ludi Xu^a, Degui Zhu^a, Yunlong Liu^a, Tohru S. Suzuki^b, Byung-nam Kim^b, Yoshio Sakka^b,
Salvatore Grasso^{a,*}, Chunfeng Hu^{a,*}

^a*Key Laboratory of Advanced Technologies of Materials, Ministry of Education, School of Materials Science and Engineering, Southwest Jiaotong University, Chengdu 610031, China*

^b*National Institute for Materials Science, Tsukuba, Ibaraki 305-0047, Japan*

*Corresponding authors: Prof. Chunfeng Hu and Prof. Salvatore Grasso

School of Materials Science and Engineering

Southwest Jiaotong University

Chengdu 610031, China

E-mail addresses: chfhu@live.cn and s.grasso@swjtu.edu.cn

Highlights

- The oxidation resistance of c-axis aligned Ti_3AlC_2 (where a and b axes were transverse) samples was investigated. The samples exhibited anisotropic oxidation resistance and basal planes showed a reduced oxidation resistance compared to a surface transverse to the c axis.
- On the basal planes the formation of $\text{Al}_2\text{O}_3+\text{TiO}_2$ was responsible for the reduced oxidation resistance. At 1473K the basal planes had a weight gain which was 45 times larger than one on a traverse plane.
- On a surface transverse to the c-axis, the rapid outer diffusion of Al atoms basal planes formed a protective Al_2O_3 scale, this phenomenon is clearly dependent on the sample orientation. Regardless the sample orientation, at 1573 K marked weight exceeding 80 mg/cm^2 was due the consumption of Al_2O_3 to form Al_2TiO_5 . This work highlights how the lattice anisotropy of Ti_3AlC_2 MAX phase is reflected on its oxidation resistance.

ABSTRACT

Oxidation resistance of textured Ti_3AlC_2 ceramics was measured in the temperature range

1273-1573 K. It was found that the oxidation was markedly anisotropic and the samples

exhibited a better oxidation resistance when tested along a direction transverse to the c-axis.

This behavior was attributed to the rapid diffusion of Al within its basal planes to form a

passivating Al_2O_3 scale and it respected Ellingham diagrams. The scales formed had different

compositions depending on the testing direction; this response was clearly resulting from the

Download English Version:

<https://daneshyari.com/en/article/7897999>

Download Persian Version:

<https://daneshyari.com/article/7897999>

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