

**MATERIAL DAMAGE IN TBCS BY A SYNTHETIC CMAS AND THE NON-DESTRUCTIVE DETECTION:
-AN EXPOIRATION VIA A SINGLE CRYSTAL YSZ-**

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Key Words: Calcium-magnesium-alumino-silicates, Thermal barrier coatings, Single crystal yttria-stabilized zirconia, Crystallographic plane, Non-destructive detection List up to five key words.

More recently a new type of damage has been pronounced in thermal barrier coatings (TBCs) by calcium-magnesium-alumino-silicates (CMAS) from ingestion of siliceous minerals under certain operating conditions, based on synthetic material in Table 1. In order to understand material aspect of CMAS damage, a study on material interaction between a synthetic CMAS and a single crystal yttria-stabilized zirconia (YSZ) was studied in this work. Here, the effect of crystallographic orientation on the interaction was also investigated. The experimental works clearly showed that the material interaction between the CMAS and YSZ was significant, resulting in the change in microstructural morphology(Fig. 1(a)). The extent of interaction depended on the crystallographic factor of the YSZ (Fig. 1(b)). The CMAS damage developed depending on the crystallographic plane of YSZ; it was the lowest onthe {111} plane.This is a noteworthy finding tomitigate the CMAS damagein EB-PVD top coat. The change in physical properties was also found to be pronounced at the CMAS damaged area. Based on these findings the non-destructive detection was also tried for engineering applications.

Acknowledgement

One of the authors, M. Okazaki, would like to thank the JSPS for financial support through grant-in-aid, category A #25249003.

Table 1 Chemical composition of model CMAS.

	SiO ₂	CaO	Al ₂ O ₃	MgO
Mol.%	51.5	39.2	4.1	5.2

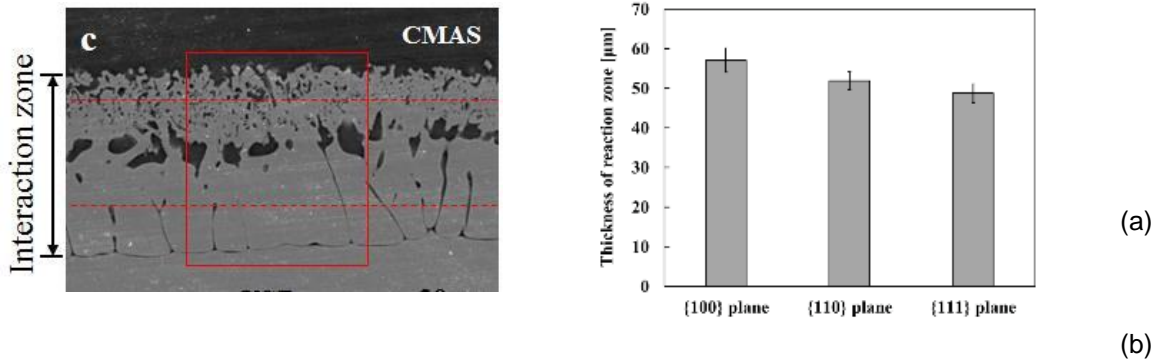


Fig. 1 CMAS attack on a single crystal YSZ.