Microstructural characterization of GZ/CYSZ thermal barrier coatings after thermal shock and CMAS+hot corrosion test

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ABSTRACT

In this study, first, Gd2Zr2O7/ceria–yttria stabilized zirconia (GZ/CYSZ) TBCs having multilayered and functionally graded designs were subjected to thermal shock (TS) test. The GZ/CYSZ functionally graded coatings displayed better thermal shock resistance than multilayered and single layered Gd2Zr2O7 coatings. Second, single layered YSZ and functionally graded eight layered GZ/CYSZ coating (FG8) having superior TS life time were selected for CMAS+ hot corrosion test. CMAS+ hot corrosion tests were carried out in the same experiment at once. Furthermore, to generate a thermal gradient, specimens were cooled from the back surface of the substrate while heating from the top surface of the TBC by a CO2 laser beam. Microstructural characterizations showed that the reaction products were penetrated locally inside of the YSZ. On the other hand, a reaction layer having ~6 μm thickness between CMAS and Gd2Zr2O7 was seen. This reaction layer inhibited further penetration of the reaction products inside of the FG8.

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