

MICROSTRUCTURAL CONTROL AND OXIDATION BEHAVIOUR OF Gd-SiAlON CERAMICS

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ABSTRACT

The purpose of the present work are to investigate the possibility of controlling the microstructure of Gd α/β -SiAlON composite materials by controlling the starting composition and to study the oxidation behaviour of these ceramics. A series of Gd α/β -SiAlON composites were prepared by pressureless sintering at 1750 °C for 4 h. Additions of SiO₂ were made to a selected composition to explore the potential mechanisms for controlling the microstructural development. Investigation on oxidation resistance of selected materials was carried out isothermally at 1350 °C in air. It was found that materials in the as-sintered state comprised a high proportion of equiaxed α' phase and a small amount of β' and AlN polytypoid. The additions of up to 5 wt% of SiO₂ was found to be effective in promoting the development of β -SiAlON. The oxidation studies show that Gd α -SiAlON based materials exhibit greater oxidation resistance at 1350 °C compared to β +YAG material. The oxidation process of Gd α/β -SiAlONs was found to follow a parabolic relationship with respect to time. The parabolic rate constant for these materials is dependent on the microstructure of the ceramics.

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