CREEP BEHAVIOR OF ADVANCED SILICON NITRIDE CERAMICS AND BEHAVIOR MODELING*

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ABSTRACT

Long-term (>20,000- to 30,000-h) creep behavior in pure tension and compression of advanced silicon nitride ceramics at high temperatures in the range of 1200 to 1500EC will be presented and probable creep and damage mechanisms will be discussed. On the basis of the experimental creep data, a deformation model inclusive of life prediction capability will be presented. The model was formulated using the state variable approach with three rate equations: a flow rule and two evolution rules. The unique strength of the model, not empowered in conventional approaches such as the Norton power-law creep and Monkman-Grant creep rupture relations, will be discussed and demonstrated with the aid of the experimental data.

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