EVALUATION OF CREEP PROPERTY OF AS800 SILICON NITRIDE FROM AS-PROCESSED SURFACE REGIONS

H. T. Lin
Metals and Ceramics Division
Oak Ridge National Laboratory
Oak Ridge, TN 38931-6068

J. Wimmer, and C. W. Li
Honeywell Ceramic Components
Torrance, CA 90504

Ceramic components with complex-shaped airfoils have been designed and implemented for industrial gas turbine applications. The airfoil region typically is subjected to high temperature and high stress during operation. Thus, the lifetime of the components should be governed by the long-term mechanical reliability of the airfoil section. Tensile creep studies were carried out to evaluate the creep performance of AS800 silicon nitride samples extracted from the surface regions of as-processed billets. The objective of this study was to understand the creep properties of the silicon nitride in the airfoil and see if they are comparable to those obtained from the bulk region. The results indicated that the material from as-processed surface region exhibited higher creep rates and, thus, shorter lifetimes as compared with those obtained from the bulk region. The differences in creep performance between as-processed surface and bulk region are related to variations in microstructure and chemistry of secondary phase.

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