

HIGH TEMPERATURE CREEP BEHAVIOUR OF  
CERIA-STABILIZED ZIRCONIA CERAMICS

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Zirconia exhibits three well defined polymorphs, the monoclinic, tetragonal and cubic phases (1). The volume change during the phase transformation from tetragonal to monoclinic on cooling, leads to microcracking and hence the material becomes mechanically weak. However addition of oxides (10-15 mol%) such as MgO, CaO, Y<sub>2</sub>O<sub>3</sub> and CeO<sub>2</sub> allows that stability of the cubic crystallographic form of zirconia from room temperature to its melting point. The ceria stabilised zirconia system have been shown very good mechanical properties (2).

In this study, two Ceria-stabilized zirconia polycrystal ceramics with small amounts (0.3 mol%) of two different sintering additives MnO<sub>2</sub> and CuO, have been used to investigate the high temperature creep properties. Creep tests were performed in an ambient air atmosphere in four point bending configuration in the temperature and stress range 975°C-1200°C and 15-85 MPa respectively. The creep rate was measured by changing the temperature while the stress is constant or vice versa.

Our results revealed that the stress exponent  $n$  for creep deformation is about 2 and the activation energy  $Q$  is about 650 kJ mol<sup>-1</sup>, for these materials. The power law creep indicates that the deformation of these materials under the above testing conditions is due to dislocation motions.

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