

DEFORMATION MECHANISMS OF FLASH SINTERED YTTRIA STABILIZED ZIRCONIA VIA IN-SITU MICROMECHANICAL TESTING

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Flash sintering has been applied to sintering a variety of ceramic materials. However, the mechanical behavior of flash-sintered ceramics is less well understood. In this study, the deformation mechanisms of flash-sintered yttria stabilized zirconia (YSZ) were investigated via in-situ microcompression test at temperatures of 25 to 650°C. The flash sintered YSZ exhibits high fracture strain due to transformation induced toughening below the test temperatures of 400°C. At higher temperatures, crack nucleation and propagation are significantly retarded, and no more catastrophic failures are observed. Strain rate jump tests were also performed at elevated temperature (450 ~ 650°C) to investigate the temperature dependent deformation mechanisms. The activation energy for deformation and its implication are discussed.