

Abstract

Monoclinic zirconia has been partially stabilized into the tetragonal phase with the addition of rare earth oxides such as ceria, dysprosia, and gadolinia. Other rare oxide additives such as lanthana, and erbia did not stabilize this phase. However, a pyrochlore-type structure was formed by their addition in zirconia.

Zirconia containing 13 mol% ceria showed highest percentage of retained tetragonal phase. The mechanical properties such as the diametrical compression and hardness of $\text{ZrO}_2 + \text{CeO}_2$ have been further improved with the addition of aluminium nitride.

The alumina partially stabilized zirconia ceramics were strengthened by adding Si_3N_4 (grain size 40- 60 μm). Remarkable high hardness and flexural strength have been achieved. The steady state creep rate of the system $\text{ZrO}_2 + \text{Si}_3\text{N}_4$ has been studied. The stress component and the creep activation energy have been determined.