

The ionic conductivity of 3mol%Y₂O₃-ZrO₂ (3Y-TZP) doped with various amount of CeO₂ and an associated peculiar phase transform are studied using AC impedance spectroscopy, scanning electron microscopy, X-ray diffraction analysis and differential thermal analysis. The total conductivity of ceria-doped 3Y-TZP specimen increases with ceria content, especially at temperature less than 500°C. The total conductivity of ceria-doped 3Y-TZP comprises the intragrain conductivity and the grain boundary (GB) conductivity. The intragrain conductivity increases with the CeO₂ content, but it is generally lower than that of 3Y-TZP. The intragrain conductivity 15mol% CeO₂-doped is almost equivalent to that of 3Y-TZP. The GB conductivity of ceria-doped 3Y-TZP is higher than that of 3Y-TZP, owing to the large grain size. The diffusion barrier of CeO₂-doped 3Y-TZP around 0.9 eV is lower than that of 3Y-TZP 1.05 eV. A peculiar phase transition in CeO₂-doped 3Y-TZP in DTA curves, which correspond to a sudden rise in its conductivity. The phase transition appears related to the pre-martensitic behavior.

Keywords: phase transformation; TZP; CeO₂; impedance spectroscopy; activation energy.