Ionic Conductivity of Gd- and Y-Doped Ceria-Zirconia Solid Solutions

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The total conductivity of the solid solutions $(Ce_{1-x}Zr_x)_{0.8}Gd_{0.2}O_{1.9}$ and $(Ce_{1-x}Zr_x)_{0.8}Y_{0.2}O_{1.9}$ was measured in air as a function of temperature (T = 300 °C – 600 °C) and composition ($x = 0.0$ – 0.9). A deep minimum of the bulk ionic conductivity was found for equal fractions of ceria and zirconia. It indicates enhanced defect association and ordering of the oxygen vacancies around $x =$ 0.5. X-ray analysis (Guinier technique) showed the diffraction pattern of the cubic fluorite structure for all investigated compositions $0 < x < 1$. The lattice parameter decreased linearly with increasing zirconia content x.

Key words: Ceria, Zirconia, Lattice Parameter, Ionic Conductivity, Impedance