Physical Properties of Mixed Conductor Solid Oxide Fuel Cell Anodes of Doped CeO2

Samples of CeO2 doped with oxides such as CaO and Gd2O3 were prepared. Their conductivities and expansions on reduction were measured at 1000°C, and the thermal expansion coefficients in the range 50 to 1000°C were determined. The ionic and electronic conductivity were derived from curves of total conductivity vs. oxygen partial pressure. For both types of conductivity a dependence on dopant valency was observed. The electronic conductivity was independent of dopant radius in contrast to the ionic which was highly dependent. These measured physical properties are compared with the ideal requirements for solid oxide fuel cell anodes. Not all requirements are fulfilled. Measures to compensate for this are discussed.

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