Synthesis and electrical characterization of Sm^{3+} doped ceria electrolytes

R.V.Mangalaraja[a], S.Ananthakumar[b], Daniel A. Rammsy Erazo[a], Marta López [a], Carlos P.Camurri [a], Ricardo E. Avila[c]

[a]Department of Materials Engineering, University of Concepción, Concepción, CHILE
[b]Materials and Minerals Division, National Institute for Interdisciplinary Science and Technology, CSIR, Trivandrum, INDIA
[c]Department of Nuclear Materials, Chilean Commission of Nuclear Energy, Santiago, CHILE

Abstract

Samarium (Sm^{3+}) doped nanocrystalline ceria electrolytes corresponding to the chemical compositions of $Ce_{0.9}Sm_{0.1}O_{1.95}$ and $Ce_{0.8}Sm_{0.2}O_{1.9}$ were synthesized by combustion technique involving mixture of cerium and samarium nitrates as oxidizers and organics such as urea, citric acid, glycine and polyethylene glycol as fuels. The amounts of Sm^{3+} doping were restricted to 10 and 20 mol%. A fully crystalline Sm^{3+} doped ceria powders with high specific surface area were obtained finally when the as prepared powders were calcined at 700°C for 2h. Cylindrical ceria pellets were fabricated by uni-axial pressing and sintered at different temperatures 1200, 1400 and 1500°C with 2, 4 and 6h soaking periods. The electrical conductivity was measured with respect to temperature and the results were correlated with the sintered microstructures and types of fuels employed.

(Key words: Samarium doped ceria, Electrolytes, Combustion synthesis, Sintering, Electrical properties).