Preparation and properties of co-doped ceria ($Ce_{0.8}Sm_{0.2-x}La_xO_{1.9}$) electrolyte materials for SOFC

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The high ionic conductivity of doped ceria makes it an attractive electrolyte for solid oxide fuel cells, whose prospects as an environmentally friendly power source are very promising. In this work, ceria-doped electrolytes of general formula $Ce_{0.8}Sm_{0.2-x}La_xO_{1.9}$ (x=0.0; 0.05; 0.10; 0.15; 0.20) were synthesized by combustion method, using glycine as a fuel. The solids solutions obtained were calcined at 700 ºC for 2 hours. The X-Rays analyses showed that the all samples were single phase with cubic fluorite structure, and the average crystallite sizes were between 40,5 and 45,3 nm. The values of specific surface area range from 16,3 to 22,2 m²/g. The consistency of particle sizes determined by X-ray analysis and BET measurements, in which the particles size were between 39,1 and 51,0 nm, suggests that powders were composed of weakly agglomerated crystallites. The ceramics sintered at 1500ºC/5h display densities between 92 to 98% of theorical densities. The electrical properties of the samples investigated by a.c. impedance spectroscopy in temperature range 300–800 °C and for frequency range 1MHz−100 mHz are also presented and discussed.
Keywords: Doped ceria, combustion method, sinterization, ionic conductivity.

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