Electrical conductivity of $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}O_{3-\delta}$ with small additions of strontium gallate

Electronic, ionic and mixed conducting ceramics

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S.L. REIS, E.N.S. MUCCILLO
Energy and Nuclear Research Institute - SAO PAULO (Brazil)

Ceramic materials based on strontium- and magnesium-doped lanthanum gallate exhibit higher ionic conductivity than yttria-stabilized zirconia, and are proposed as solid electrolyte for solid oxide fuel cells operating at intermediate temperatures (500-700 ºC). Sintering of this solid electrolyte is usually carried out at high temperatures, yielding loss of gallium and consequent formation of secondary phases. In this work, the composition $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}O_{3-\delta}$ with small additions of strontium gallate was prepared by solid-state reaction and the influence of the additive on the ionic conductivity and phase composition was investigated. The sintered solid electrolytes achieved densities higher than 95% of the theoretical value and the average grain size amounts 2.40 μm after sintering at 1350°C. The contents of secondary phases decreased with increasing strontium gallate additions. The additive was found to have a beneficial effect on the bulk ionic conductivity.