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CONTACT (NAME ONLY): Eliana Muccillo
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TITLE: Ionic Conductivity and Microstructure of Fast Fired Sr- and Mg-Doped Lanthanum Gallate
AUTHORS (FIRST NAME, LAST NAME): Shirley Leite Reis[1], Eliana Navarro dos Santos Muccillo[1]
INSTITUTIONS (ALL):
1. Energy and Nuclear Research Institute, Sao Paulo, --- Please Select ---, Brazil.
ABSTRACT BODY:
Abstract Body: Sr- and Mg-doped lanthanum gallate is a perovskite oxide ion conductor with high ionic conductivity compared to yttria-stabilized zirconia. This solid electrolyte is a promising material for application in solid oxide fuel cells operating at intermediate temperatures (~500-700°C). In this work, the effects of the sintering profile on the ionic conductivity and microstructure evolution were systematically investigated. The nominal composition $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}O_{3-d}$ was prepared by solid state reaction. After calcination at 1250°C, the powder mixture was pressed into pellets and fast fired at 1450°C for 5 and 10 min, and at 1500°C for 5 min. The X-ray diffraction patterns show typical reflections of the orthorhombic perovskite-type structure along with few reflections due to secondary phases, $SrLaGaO_4$, $La_4Ga_2O_9$ and $SrLaGa_3O_7$. Fast fired specimens at 1450°C for 10 min exhibited negligible secondary phases. The sintered density increases with increasing dwell temperature and time. The mean grain size varied from 2.3 to 3.4 μm. The grain conductivity is unchanged with the dwell time but decreases with increasing the dwell temperature. The grain boundary blocking effect is lower for specimens fast fired at 1450°C for 10 min, probably due to the negligible fraction of secondary phases of these specimens.
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