Characteristics of strontium-doped neodymium manganite obtained by the standard ceramic technique

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Abstract:
In an attempt to reduce operating temperatures of Solid Oxide Fuel Cells (SOFC), a variety of ceramic materials are currently being studied as possible cathodes. Several ceramic materials can act as cathodic components, including Strontium-Doped Neodymium Manganite ($Nd_{1-X}Sr_XMnO_{3\pm\delta}$ - NSM). This work presents the physical, chemical and microstructural characteristics of NSM powders synthesized by a solid state reaction method. X-ray diffraction and electrical conductivity of this material with a perovskite structure was studied as a function of x equal to 0.10, 0.30 and 0.50. The SEM micrographs revealed that the sizes of the particles, which appeared as agglomerates, were less than 1 μm. This finding was further confirmed by laser scattering granulometry analysis (< 0.5 μm). The powders were also examined by XRD, which revealed the formation of the main phase NSM and minor amounts of a secondary phase Nd_2O_3. An orthorhombic pseudo-perovskite structure was assigned to the different powder compositions. Electrical conductivity (EC) was described by the small polaron hopping conductivity model, and its increase attributed to regular increments of Sr in all compositions. EC at 800ºC was found to be 25.2, 26.4 and 37.1 Scm^{-1} for x equal to 0.10, 0.30 and 0.50 respectively.