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Preparation and characterization of $\text{La}_{0.6}\text{Sr}_{0.4}\text{Fe}_{0.8}\text{Mn}_{0.2}\text{O}_{3-\delta}$ cathode of intermediate temperature solid oxide fuel cells

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Abstract

The aim of this study is to investigate the properties of the $\text{La}_{0.6}\text{Sr}_{0.4}\text{Fe}_{0.8}\text{Mn}_{0.2}\text{O}_{3-\delta}$ (LSFM) compound as cathode of intermediate temperature solid oxide fuel cells. The LSFM compound was synthesized by the sol-gel process. The structural, electrical and electrochemical properties of LSFM were tested via X-ray diffraction (XRD), scanning electron microscopy (SEM), high temperature four-probe resistivity measurement (HTRM) and electrochemical impedance spectroscopy (EIS). The X-ray pattern showed that sample had a Rhombohedra structure and space group symmetry of LSFM is $R\bar{3}c$; also, the LSFM had good chemical compatibility with YSZ electrolyte. The conductivity of the sample was increased with raising the temperature. The maximum electrical conductivities for the LSFM compound were equal to $3.64 \text{ S}\cdot\text{cm}^{-1}$ in air at $739 \text{ }^\circ\text{C}$. The cathode area specific resistance of LSFM was 1.69, 1.01, 0.63, 0.52, and $0.45 \text{ } \Omega \text{ cm}^2$ at 600, 650, 700, 750, and $800 \text{ }^\circ\text{C}$, respectively.

Keywords: solid oxide fuel cell, cathode, electrical conductivity, area specific resistance

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