Short Communication

Electrochemical Characteristics of $\text{La}_{0.65}\text{Sr}_{0.3}\text{MnO}_3$ and $\text{La}_{0.8}\text{Sr}_{0.2}\text{MnO}_3$ Nanoceramic Cathode Powders for Intermediate Temperature Solid Oxide Fuel Cell (SOFC) Application

G.N. Almutairi*, Y. M. Alyousef, F.S.Alenazey, S. A Alnassar, H. Alsmail and M. Ghouse

Water and Energy Research Institute (WERI), King Abdulaziz City for Science and Technology (KACST) PO.Box.6086, Riyadh 11442, Saudi Arabia

*E-mai: gmutari@kacst.edu.sa

doi: 10.20964/2017.09.58

Received: 3 October 2016 / Accepted: 6 July 2017 / Published: 13 August 2017

In the present investigation, $\text{La}_{0.65}\text{Sr}_{0.3}\text{MnO}_3$ (LSM-1) and $\text{La}_{0.8}\text{Sr}_{0.2}\text{MnO}_3$ (LSM-2) nanoceramic powders were prepared by the citrate-nitrate route of auto-combustion with citrate to nitrate (c/n) ratio : 0.50 to assess the effect of these cathode powders on the performance of single SOFC cells. The prepared powders were calcined at 900 °C for 4hrs to remove carboneous residues and characterized them using SEM / EDS, XRD, TGA techniques. The electrochemical characterization of LSM cathode powders were carried out by coating these powders (as cathode functional layer CFL-Bottom and current collector layer CL-Top) using screen printing on the SOFC half cells (NiO-YSZ+YSZ) procured from CGCRI, Kolkata, India with a cell size of 36 mm dia x1.6 mm. These cells were tested with $\text{H}_2\text{-O}_2$ at 700-800 °C with the flow rates of 1.2-1.8 L min⁻¹ of hydrogen and 0.4-0.6 L min⁻¹ of oxygen. The current density and powder density values obtained for SOFC single cells were 0.85 A cm⁻² (at 0.7 V) and 0.58 W cm⁻² at 800 °C with 1.8 L min⁻¹ hydrogen and 0.60 L min⁻¹ oxygen. The area surface resistance (ASR) values obtained were ~0.52-0.58 Ω cm² at 0.7 V at 800 °C.

Keywords: Strontium-doped lanthanum manganite, Solid Oxide Fuel Cell, Nickel anode, Ytria-stabilized zirconia, Cathode functional layer, Current collector layer

[FULL TEXT](#)

© 2017 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).