Short Communication

Enhanced Electrochemical Properties of Lu-doped BaCeO₃ and KCl-NaCl Composite as Electrolyte for Intermediate Temperature Solid Oxide Fuel Cells

Yan Han, Ruifeng Du, Chang Wang, Hongbin Zhai, Fufang Wu*, Hongtao Wang*

¹ School of Chemical and Material Engineering, Fuyang Normal University; Anhui Provincial Key Laboratory for Degradation and Monitoring of Pollution of the Environment, Fuyang 236037, China

² Guangdong Provincial Key Lab of Nano-Micro Materials Research, School of Chemical Biology and Biotechnology, Peking University Shenzhen Graduate School, Shenzhen 518055, China

*E-mail: hwang@fync.edu.cn, wff05001@fync.edu.cn

doi: 10.20964/2019.08.63

Received: 7 April 2019 / Accepted: 24 May 2019 / Published: 30 June 2019

In this study, BaCe_{0.9}Lu_{0.1}O_{3-α} was prepared by the sol-gel method with cerium nitrate, lutetium oxide and barium acetate as raw materials and BaCe_{0.9}Lu_{0.1}O_{3-α}-NaCl-KCl composite electrolyte was also synthesized using BaCe_{0.9}Lu_{0.1}O_{3-α} combined with sodium and potassium chloride. The samples were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and thermal analyser. TGA-DSC plots indicated that a perovskite-type structure was formed above 1040 °C. The highest conductivities of BaCe_{0.9}Lu_{0.1}O_{3-α} and BaCe_{0.9}Lu_{0.1}O_{3-α}-NaCl-KCl were $9.5 \times 10^{-2} \text{ S} \cdot \text{cm}^{-1}$ and $2.8 \times 10^{-1} \text{ S} \cdot \text{cm}^{-1}$ at 700 °C, respectively. The highest power density of BaCe_{0.9}Lu_{0.1}O_{3-α}-NaCl-KCl was 146 mW·cm⁻² at 700 °C.

Keywords: Defects; Hydrogen; Electrolytes; Fuel cell; Conductivity; Composite

[FULL TEXT](#)

© 2019 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/>).