Low Temperature Synthesis of $\text{SrCe}_{0.9}\text{Eu}_{0.1}\text{O}_{3-\alpha}$ by Sol-Gel Method and $\text{SrCe}_{0.9}\text{Eu}_{0.1}\text{O}_{3-\alpha}$ -NaCl-KCl Composite Electrolyte for Intermediate Temperature Fuel Cells

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doi: 10.20964/2017.12.81

Received: 22 August 2017 / Accepted: 13 October 2017 / Published: 12 November 2017

$\text{SrCe}_{0.9}\text{Eu}_{0.1}\text{O}_{3-\alpha}$ (SCEu-SG) electrolyte was prepared via the sol-gel method at a low heat-treating temperature of 1100 °C. The transport properties of SCEu-SG are studied using gas concentration cells. The results indicate that the protonic conduction of SCEu-SG is good in hydrogen-containing atmospheres. $\text{SrCe}_{0.9}\text{Eu}_{0.1}\text{O}_{3-\alpha}$ -NaCl-KCl (SCEu-SG-NK) composite electrolyte was also fabricated and tested at between 500-700 °C. The conductivity of SCEu-SG-NK was observed to be $1.44 \times 10^{-1} \text{ S} \cdot \text{cm}^{-1}$ in dry nitrogen at 700 °C. A maximum power density of $207 \text{ mW} \cdot \text{cm}^{-2}$ at 700 °C was achieved for the fuel cell based on the SCEu-SG-NK composite electrolyte which is much higher than that of single cerium strontium material, SCEu-SG ($13.1 \text{ mW} \cdot \text{cm}^{-2}$).

Keywords: $\text{SrCe}_{0.9}\text{Eu}_{0.1}\text{O}_{3-\alpha}$ (SCEu-SG); Composite electrolyte; Fuel cell; Ceramics; sol-gel preparation

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