Short Communication

The preparation and electrochemical performance of $\text{Lu}^{3+}/\text{Gd}^{3+}$ co-doped ceria-chloride composite electrolyte

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doi: 10.20964/2021.01.56

Received: 1 October 2020 / Accepted: 16 November 2020 / Published: 30 November 2020

In this study, $\text{Ce}_{0.8}\text{Gd}_{0.1}\text{Lu}_{0.1}\text{O}_{2-\alpha}$ was synthesized by a sol-gel method. And $\text{Ce}_{0.8}\text{Gd}_{0.1}\text{Lu}_{0.1}\text{O}_{2-\alpha}(\text{Na/K})\text{Cl}$ composite electrolyte was prepared at 750 °C. The phase composition, microstructure, conductivity and fuel cell properties of the composite were studied at 500–750 °C. The XRD results showed that no chemical reaction occurred between chloride and $\text{Ce}_{0.8}\text{Gd}_{0.1}\text{Lu}_{0.1}\text{O}_{2-\alpha}$. The $\log \sigma \sim \log (p\text{O}_2)$ results showed that $\text{Ce}_{0.8}\text{Gd}_{0.1}\text{Lu}_{0.1}\text{O}_{2-\alpha}(\text{Na/K})\text{Cl}$ is a pure ionic conductor in an oxidizing atmosphere. The performance of oxygen concentration discharge cell further showed that $\text{Ce}_{0.8}\text{Gd}_{0.1}\text{Lu}_{0.1}\text{O}_{2-\alpha}(\text{Na/K})\text{Cl}$ is an excellent oxygen ion conductor in an oxidizing atmosphere.

Keywords: Composite; Electrolyte; Fuel cell; CeO_2 ; Conductivity

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