Short Communication

Gadolinium Doped Strontium Cerate Prepared by Citric-Nitrate Auto-Combustion Process and Intermediate Temperature Electrical Properties of Its Composite Electrolyte

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In this work, $\text{SrCe}_{0.9}\text{Gd}_{0.1}\text{O}_{3-\alpha}$ electrolyte was prepared by a citric-nitrate auto-combustion (CNA) method using Gd_2O_3 , HNO_3 , $\text{Sr}(\text{NO}_3)_2$, $(\text{NH}_4)_2\text{Ce}(\text{NO}_3)_6$ and citric acid as raw materials and subsequently compounded with NaCl/KCl. The XRD results have shown that no reactions between $\text{SrCe}_{0.9}\text{Gd}_{0.1}\text{O}_{3-\alpha}$ and NaCl/KCl have taken place. The SEM examinations reveal that the particle size of $\text{SrCe}_{0.9}\text{Gd}_{0.1}\text{O}_{3-\alpha}$ is uniform, and the surface is uniformly covered by NaCl/KCl that acts as the $\text{SrCe}_{0.9}\text{Gd}_{0.1}\text{O}_{3-\alpha}$ particle binder. The ionic and protonic conduction of $\text{SrCe}_{0.9}\text{Gd}_{0.1}\text{O}_{3-\alpha}$ (SCGd-CNA) was studied by using gas concentration cells. The fuel cell based on $\text{SrCe}_{0.9}\text{Gd}_{0.1}\text{O}_{3-\alpha}$ -NaCl-KCl (SCGd-CNA-NK) exhibits excellent cell performance with a maximum power output density of $215 \text{ mW}\cdot\text{cm}^{-2}$ at 700°C , which is much higher than for single cerium strontium material, SCGd-CNA, *i.e.* $20.7 \text{ mW}\cdot\text{cm}^{-2}$ at 700°C .

Keywords: Composite; Electrolyte; Fuel cell; SrCeO_3 ; Conductivity

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