Short Communication

Intermediate Temperature Electrochemical Properties of Al^{3+} and K^{+} Double Doped Strontium Silicate

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In this study, K^{+} and Al^{3+} double doped strontium silicate was synthesized via a solid state reaction method using strontium carbonate, silicon dioxide, potassium carbonate and aluminum trioxide as raw materials. Intermediate temperature conductivities and fuel cell properties of $\text{Sr}_{0.6}\text{K}_{0.4}\text{Si}_{0.9}\text{Al}_{0.1}\text{O}_{3-\alpha}$ electrolyte were studied. X-ray diffractions of $\text{Sr}_{0.6}\text{K}_{0.4}\text{SiO}_{3-\alpha}$ and $\text{Sr}_{0.6}\text{K}_{0.4}\text{Si}_{0.9}\text{Al}_{0.1}\text{O}_{3-\alpha}$ results showed that the second phase of $\text{K}_2\text{Si}_2\text{O}_5$ can be effectively inhibited when two metal oxides are doped. The relation between conductivity and temperature of the samples indicated that the curves agreed well with the Arrhenius formula. $\text{Sr}_{0.6}\text{K}_{0.4}\text{Si}_{0.9}\text{Al}_{0.1}\text{O}_{3-\alpha}$ showed the highest maximum power density of $44.2 \text{ mW}\cdot\text{cm}^{-2}$ at 800°C .

Keywords: Electrolyte; SrSiO_3 ; Fuel cell; Conductivity; XRD

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