

Characteristics and performance of Bi_2O_3 - doped ceria samaria composite electrolytes for intermediate temperature Solid Oxide Fuel Cells

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Intermediate-temperature solid oxide fuel cells (ITSOFCs) have received much attention since their cost reduction, inexpensive materials and novel fabrication techniques. In this research, we developed a new kind of Bi_2O_3 - doped ceria samaria (Bi_2O_3 -SDC) composite electrolyte for the application of ITSOFCs. Bi_2O_3 has been chosen as sintering aid since its low melting point ($\approx 817^\circ\text{C}$) which acts as a sintering aid. Then my research focused on the characteristics and performance of Bi_2O_3 -SDC composite in various weight ratios (1%, 5%, 10%, 20%). Based on the porosity value, the composite with 20wt% of Bi_2O_3 is selected to continue the other experiments (porosity is less than 5%). The conductivity is measured under air condition and the maximum conductivity can get 0.024 Scm^{-1} and 0.077 Scm^{-1} at 600°C and 700°C , respectively. Single cells with the composite electrolyte are fabricated by cold-press method using NiO/SDC as anode and LSCF ($\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.2}\text{Fe}_{0.8}\text{O}_3$) as cathode. The cell shows a maximum power density of 187 mWcm^{-2} , 272 mWcm^{-2} , 410 mWcm^{-2} at 600°C , 650°C , 700°C , respectively.