

Indium Oxide/Scandium Doping Yttria-Stabilized Zirconia Composite Films as Electrolytes for Solid Oxide Fuel Cells

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Abstract : In this study, scandium-doped yttria-stabilized zirconia (ScYSZ) and In₂O₃ nanoparticles (NPs) with cubic crystalline structures were successfully prepared using a facile hydrothermal process. ScYSZ films were prepared by the pressing of ScYSZ NPs and were further used for the electrolyte of solid oxide fuel cells (SOFCs). To increase the ionic conductivity of the ScYSZ electrolyte, different amounts of In₂O₃ NPs [0 wt% (X(In₂O₃)=0), 0.21 wt% (X(In₂O₃)=0.001) and 1.13 wt% (X(In₂O₃)=0.005)] were doped in the ScYSZ films to increase their oxygen vacancy. The result shows In₂O₃ NP/ScYSZ films with 1.13 wt% (X(In₂O₃)=0.005) In₂O₃ NPs doping are with largest ionic conductivity of 0.057Ω⁻¹ cm⁻¹ at 900°C, which is 1.6 and 1.8 times higher than YSZ and In₂O₃ NP/ScYSZ films with 0.21 wt% (X(In₂O₃)=0.001) In₂O₃ NPs doping, respectively.

Keywords : indium oxide/scandium doping Yttria-stabilized zirconia, solid oxide fuel cells, scandium-doped yttria-stabilized zirconia, indium oxide

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