

Comparison of Sputter-deposited Single and Multilayer Electrolytes based on Gadolinia-doped Ceria and Yttria-stabilized Zirconia for Solid Oxide Fuel Cells

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Single and multilayer electrolytes for anode-supported solid-oxide fuel cells (SOFCs) have been prepared by reactive magnetron sputtering and their electrochemical properties have been investigated. Electrolyte layers based on gadolinia-doped ceria (GDC) and yttria-stabilized zirconia (YSZ) were formed on NiO/YSZ substrates. The cells with single (YSZ), double (YSZ-GDC) and triple-layer (GDC-YSZ-GDC) electrolytes were tested, with the thickness of each electrolyte layer from 1 to 5 μm . The maximum cell performances of 460 and 2580 mW/cm^2 were obtained for the SOFC with triple-layer electrolyte at the operating temperature of 600°C and 800°C respectively. The thickness of each electrolyte layer was about 3, 1 and 1 μm respectively. The advantages of multilayer over single-layer electrolytes are discussed.

Keywords: SOFC, Thin-film electrolyte, Magnetron sputtering, Gadolinia-doped ceria, Yttria-stabilized zirconia.

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