SOLID OXIDE FUEL CELL ANODE SURFACE MODIFICATION BY MAGNETRON SPUTTERING OF NIO/YSZ THIN FILM

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NiO/ZrO_2-Y_2O_3 (NiO/YSZ) anode functional layers (AFL) with a 20–60 vol.% NiO were deposited onto NiO/YSZ anode substrates by magnetron sputtering, followed by annealing in air at 1200 °C. The optimal conditions for NiO/YSZ deposition were determined. NiO content was varied by changing the oxygen flow rate during the sputtering process. The microstructure and phase composition of NiO/YSZ AFL were studied by SEM and XRD methods. NiO/YSZ films were fully crystallized and comprised of grains up to 200 nm in diameter after reduction in hydrogen. Anode-supported solid oxide fuel cells (SOFC) with a diameter of 20 mm including AFL, 5 microns-thick YSZ electrolyte and La0.6Sr0.4Co0.2Fe0.8O3/Ce0.9Gd0.1O2 (LSCF/CGO) cathode were fabricated and tested. The electrochemical properties of SOFC were investigated as a function of NiO volume content in AFL. With an AFL introduced into anode/electrolyte interface, significantly enhanced SOFC performance was achieved.

***Keywords:** Magnetron sputtering, Solid oxide fuel cell, Ni/YSZ anode, Anode functional layer.*