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Gadolinium-doped Barium Zirconate Thin Films on Barium Zirconate/Nickel Cermets for Applications in Intermediate Temperature Solid Oxide Fuel Cells ALEX SKINNER, KELLY DILLON, ERIC REMINGTON, RENATO CAMATA, University of Alabama at Birmingham — Solid oxide fuel cells (SOFCs) are electrochemical devices that convert chemical energy into electricity using ion-conducting oxide ceramics as electrolytes. Thin films of gadolinium-doped barium zirconate (BZG) have been developed in our lab, and have the potential to lower SOFC operating temperatures. A suitable substrate and anode material is needed for the deposition of these films. Barium zirconate/nickel cermets were fabricated from barium zirconate and nickel oxide powders. Samples were mechanically mixed, pressed into pellets and annealed at 1400C. Reduction of these cermets was then carried out in a hydrogen-containing atmosphere at 650C to reduce the nickel oxide to nickel metal, making them conductive. Pulsed laser deposition (KrF; 0.5-1 J/cm^2) was used to deposit BZG as thin films on various cermets in a 20-100 mTorr oxygen environment and at a temperature of 850C. Electrical measurements were taken of the samples using an electrochemical impedance spectroscopy (EIS) system and compared to the cermets prior to deposition. X-ray diffraction measurements are used to study the crystallinity of the films deposited on the cermets in comparison to results obtained on other conventional substrates such as MgO and platinum.

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