PO1044

Reactive magnetron sputtering gadolinia-doped ceria diffusion barriers for anode ceramic sbatrate of solid oxide fuel cells

Carlos Ignacio Hernandez Londono[1], carlos ignacio londoño[2]

[1]Femto-st, Montbeliard, France [2]Femto-ST, Montbeliard, France

carlos.hernandezlondono@utbm.fr

PVD by plasma emission monitoring (PEM) was employed to synthesize GDC (10%Gd doped ceria) thin films on anode-grade ceramic substrate and steel AISI340. Reactive magnetron sputtering deposition technique was used for formation of gadolinium doped ceria (GDC) 5-10µm thin films. Material characteristics and chemical compositions of GDC films were investigated by X-ray diffraction (XRD) and scanning electron microscopy (SEM). By optimization of preparative parameters of PEM and modification of surface of anode ceramic substrate. An Alcatel SCM650 sputtering chamber was used for synthesizing the dense GDC layers. A Ce-Gd metallic target (90 10% at) was powered by a pinnacle + pulsed current generator from Advanced Energy. Gadolinine ceramics (GDC10) were made from a metal target of Ce-Gd in a reactive atmosphere. Working in a reactive condition allows better control of the process and higher deposition rates compared to the use of a ceramic target. The microstructural morphological surface features of the half-cell complete cell were analyzed by Scanning Electron Microscopy (SEM), X-ray diffraction (XRD). The chemical states of the surface of the prepared sample were analyzed by X-ray photoelectron spectroscopy (XPS) and 3D profilometry and was employed to nos-destructively quantify the craking and behavior observed before and after different annealing. Finally, the EIS (Electrochemical Impedance Spectroscopy) measurements were performed on NiO-GDC/GDC half-cells under 60 sccm nitrogen by the means of a Solartron SI 1260 impedance / gain analyzer from 20 MHz to 0.1 Hz with 11 points per decade.

Keywords
SOFC
Magnetron
GDC10
Coatings
Electrochemical