Int. J. Electrochem. Sci., 14 **(2019)** 575 – 584

International Journal of
ELECTROCHEMICAL
SCIENCE
www.electrochemsci.org

Short Communication

Magnetron Sputtering of Gadolinium-doped Ceria Electrolyte for Intermediate Temperature Solid Oxide Fuel Cells

Andrey A. Solovyev[*], *Sergey V. Rabotkin, Anna V. Shipilova, Igor V. Ionov*

Laboratory of Applied Electronics, Institute of High Current Electronics, Siberian Branch of the Russian Academy of Sciences, Tomsk, Russia
[*]E-mail: andrewsol@mail.ru

doi: 10.20964/2019.01.03

Received: 29 August 2018 / *Accepted:* 25 October 2018 / *Published:* 30 November 2018

Reactive magnetron sputtering was used for deposition of thin Gd-doped ceria (GDC) films on porous NiO–YSZ (nickel oxide–yttria stabilized zirconia) substrates. X-ray diffraction and scanning electron microscopy were used to study the effect of cathode peak power density on 5–7 μm-thick film's microstructure and surface morphology. It was shown that peak power density (changed from 52 to 490 W/cm^2) has an effect on the crystallite size, microstrains and texture coefficient of the GDC electrolyte. Increasing peak power density suppresses the columnar structure of deposited films and leads to formation of more continuous and denser films. As a result, anode-supported single cells with sputtered at room temperature GDC electrolyte were fabricated and demonstrated maximum power density of 1.07 W/cm^2 at 750 °C.

Keywords: Gadolinium-doped ceria, Magnetron sputtering, SOFC, Microstructure, Electrochemical performance.

FULL TEXT