Influence of Wavelength on Photo-Assisting Anodic Electrodeposition of Ceria Thin Films

Yang Yang¹, Ze-gang Dong¹, Zhao Zhang^{2,*}, Yu Chen², Yin-ye Yang¹, Hai-jun Du³

¹ School of Materials Science and Engineering, Guizhou Minzu University, Guiyang 550025, P. R. China

² Department of Chemistry, Zhejiang University, Hangzhou 310027, P. R. China

³ School of Chemistry and Eco-Environmental Science, Guizhou Minzu University, Guiyang 550025, P. R. China

*E-mail: eaglezzy@zjuem.zju.edu.cn

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Cerium oxide films have been anodically deposited with photo-assisting onto 316L stainless steel in bath solution containing 0.05 M cerium (III) nitrate, 0.1 M ammonia acetate and 70 % (V/V) ethanol. Three monochromatic photo wavelengths (254 nm, 365 nm and 415 nm) have been discussed. The electroplating behaviors and the structural of the films were investigated with *i-t* curves, ellipsometry, scanning electron microscopy, glancing angle X-ray diffraction, and Raman and X-ray photoelectron spectroscopy. Results show that, photo irradiation favors the anodic growth of ceria films. With shortening the incident photo wavelength from 415 nm to 254 nm, the film thickness increase from 20.8 nm to 32.4 nm and the film crystallinity was enhanced. Moreover, shortening of the photo wavelength has a negligible effect on both the stoichiometry and the preferential orientation growth of the deposits.

Keywords: Anodic electrodeposition; Photo irradiation; Ceria thin films

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