Nucleation, Growth, and Characterization of MnO2 Thin Films deposited by an Electrochemical Process on ITO

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Abstract

Recent advances in the field of solar cell have led to renewed interest thin films deposited on ITO. Types of thin films such as Cu_2ZnSnS_4[1], Zno/Zno/grapheme[2], Nis[3] and …were applied in solar cell. The metal oxide thin films are an important group of the nanostructured materials. The nano materials of thin films can be synthesized and grown by different techniques [4]. In this study, the substrates applied were ITO-coated glasses with a manganese dioxide nanostructures film were prepared by an electrochemical method. The electro deposition were performed by constant current mode with a current density of 10 mA/cm^2 at lab temperature as two electrode at 1, 2:50, 5 and 60 min. Roughness of the thin films has been characterized by Atomic force microscopy (AFM). The absorption spectra of Mno_2 films with varying thicknesses were obtained between 300 and 1100 nm at room temperature with using UV-Vis spectrophotometer. The AFM images showed that the MnO_2 nanostructures growth mode is island and also, increase in the deposition time caused a decrease in the roughness average of the films surface. The absorption spectra of deposited films were increased by increase in the deposition time.

Keywords: *MnO_2 thin film, electrochemical process, Nucleation, Growth.*

Reference

(1) Courel, M.; Valencia-Resendiz, E.; Andrade-Arvizu, J.A.; Saucedo, E.; Vigil-Galán, O.; Sol. Energ. Mat. Sol. C., **2017**, 159, 151.
(2) Abbasi, H. Y.; Habib, A.; Tanveer, M.; J. Alloy. Compd., **2017** , 690, 21-26
(3) Young-Seok Lee, Gopi C. V.V.M.; Venkata-Haritha M.; Srinivasa Rao S.; Kim H. J.; J. Photoch. Photobio. A., **2017**, 332, 200.
(4) Falahatgar S. S.; Ghodsi F. E., Int. J. Nanosci. Nanotechnol. **2016**, 12, 7.