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Extended Abstract

Emerging Materials and Nanotechnolgy: Chemisorbed CO2 on the Surface of Co-SnO2, characterization and room temperature gas sensor- Mohamed A Basyooni , Mohamed Shaban and Gamal F Attia- University of Konya Necmettin Erbakan, Turkey

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Abstract

Pure and Cobalt doped Tin oxide (SnO2 and SnO2: Co) thin films of varying thickness were successfully fabricated by the sol-gel spin coating technique. The samples were characterized by X-ray diffraction (XRD) and scanning electron microscope (SEM). The effect of a number of layers on the structural and optical properties of SnO2and SnO2:Co films was studied. The crystallite size of the pure SnO2films increased from 7.7 to 31.1 nm by increasing the number of layers from 12 to 24. The crystallinity of the film enhanced with increasing the annealing temperature from 400 C to 500 C. However, it reduced by incorporating Co atoms. The transmittance and the optical band gap of the SnO2 film decreased by increasing the number of layers or after Co doping. The 8% Co-doped film shows relatively higher sensitivity for CO2 gas at room temperature (RT) compared to un-doped SnO2 film. The rate of increase of sensitivity with respect to CO2 concentration is 0.116/sccm for Co-doped SnO2. In this study, the carbon dioxide gas acted as an oxidizing agent that caused the increase in the electrical resistance of the sensor signified by the increase in voltage reading. Carbon dioxide sensing mechanism involves its disintegration into CO- and O-. These species are adsorbed on the surface of the thin film. The negative charge trapped in these oxygen species caused an upward band bending on the SnO2nanomaterial thus increasing its resistance compared to the flat band situation before CO2 gas exposure.

The response and recovery times increased as the CO2concentration increased. The obtained results illustrate the possibility of controlling the film???s physical properties for sensing and optoelectronic applications. Recent Publication 1. Mohamed A Basyooni, Ashour M Ahmed and Mohamed Shaban (2018) Plasmonic hybridization between two metallic nanorods. Optik Optik - International Journal for Light and Electron Optics DOI: 10.1016/j. ijleo.2018.07.135. 2. Mohamed A Basyooni, Mohamed Shaban and Adel M El Sayed (2017) Enhanced gas sensing properties of spin-coated Na-doped ZnO nanostructured films. Scientific Reports 7:41716. 3. Mohamed Shaban, G F Attia, Mohamed A Basyooni and Hany Hamdy (2015) Morphological and Structural Properties of spin coated Tin Oxide thin films. International Journal of Engineering and Advanced Research Technology 1(3):1-14. 4. Mohamed Shaban, Mohamed A Basyooni, G F Attia, Hany Hamdy () Synthesis and Characterization of Tin Oxide thin Films and Effect of annealing on Multilayer Film, The 5th international conference on modern Trends in Physics Research (MTPR-014), 15-19 December 2014, Cairo University, Egypt. The WPS International Conference Proceedings of the Fifth MTPR-014 Conference, Volume 9914, June 2015

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