




Nanostructured CdO–ZnO composite thin films for sensing application

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ABSTRACT

CdO–ZnO nanocomposites were synthesized by the facile SILAR method. In synthesis, 0.1 M Cd (NO₃)₂ and 0.1 M Zn (NO₃)₂ were used as sources of Cadmium and Zinc ions, respectively. The supersaturated solutions of Cd and Zn ions served as a cationic bath while 0.075 M NaOH as an anionic bath. To synthesize composite samples, the number of dipping is varied as 1:1, 1:2, and 1:3 concerning (CdO–ZnO). The XRD patterns of composite samples exhibit distinct peaks of ZnO and CdO, which clearly indicates the formation of CdO–ZnO nanocomposites in thin film form. The FE-SEM shows interlocked sheets with a thickness varies from ~ 30 nm to 300 nm for composites. EDAX mapping and XPS study, confirms that the obtained nanocomposite is actually composed of CdO and ZnO. The gas sensing behavior of CdO–ZnO is systematically investigated for 4 test gases under different operating temperatures and different gas concentrations. The maximum response of 52.04% is obtained for 24 ppm of Ethanol at a minimum operating temperature of 325 °C.

1 Introduction

Currently, a great deal of research is concentrated on the development of gas sensors for monitoring and detection of toxic gases. Numerous materials have been investigated for gas sensor applications. The development of fast and sensitive gas sensors with

small cross-sensitivity is the subject of intense research in the field of nanoscience and nanotechnology. However, developments in nanotechnology create a window for the synthesis of unique classes of nanostructured materials with enhanced gas sensing properties. The metal oxide semiconductors are attracted significant interest in the industrial and

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