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New fabrication of zinc oxide nanostructure thin film gas sensors

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Abstract

The copper doped zinc oxide thin films have been prepared by sol-gel spin coating method. The structural and morphology properties of the Cu doped films were characterized by X-ray diffraction and atomic force microscope. XRD studies confirm the chemical structure of the ZnO films. The optical spectra method were used to determined optical constants and dispersion energy parameters of Cu doped ZnO thin films. The optical band gap of undoped ZnO was found to be 3.16 eV. The E-g values of the films were changed with Cu doping. The refractive index dispersion of Cu doped ZnO films obeys the single oscillator model. The dispersion energy and oscillator energy values of the ZnO films were changed with Cu doping. The Cu doped ZnO nanofiber-based NH3 gas sensors were fabricated. The sensor response of the sensors was from 464.98 to 484.61 when the concentration of NH3 is changed 6600-13,300 ppm. The obtained results indicate that the response of the ZnO film based ammonia gas sensors can be controlled by copper content. (C) 2013 Elsevier Ltd. All rights reserved.

Keywords

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