

Synthesis and Characterization of Ni-Doped ZnO Thin Films Prepared By Sol–Gel Spin-Coating Method

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Ni-doped ZnO (ZnO:Ni) thin films were deposited onto glass substrate by sol–gel spin-coating method using zinc acetate dehydrate and nickel (II) chloride hexahydrate. The structural, morphological, and optical properties of ZnO:Ni thin films under various doping level of nickel were investigated using X-ray diffraction (XRD), ultraviolet–visible transmission spectra (UV-Vis), atomic force microscope (AFM), scanning electron microscopy (SEM) and Fourier transform infrared (FTIR) measurements. XRD patterns indicated that the deposited films had a crystalline hexagonal wurtzite structure with preferred orientation in the (002) plane when the grain size varied between 36.5 and 44.5 nm. All films were found to exhibit a good transparency in the visible range with the maximum transmittance of 95% and the optical band gap energies were found between 3.15 and 3.22 eV. The SEM morphology shows the non-doped and Ni-doped ZnO thin films are continuous, dense, and distributed over the entire area with good uniformity. All parameters procured for Ni:ZnO composite thin films propel the possibility of using composite thin films for transparent conducting electrode applications.

Keywords: ZnO:Ni, sol–gel spin-coating, structural, optical, morphological.

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