Effects of annealing on the structural and optical properties of ZnO thin films synthesis by spin-conting

T. KACEL, A. Ziouche, A. Boukerika

Abstract : Zinc oxide thin films were deposited on microscope glass substrate by spin-coating method,from a precursor solution containing zinc acetate dissolved in methanol. ZnO thin films were obtained after preheating the spin coated thin films at 300 °C for 3 min after each coating. The films, after the deposition of the 9-layer, were annealed in air at various temperatures of 400 °C, 500 °C and 600 °C for 2 h for complete oxidation. The structural and optical properties of ZnO films were characterized by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), UV-visible and photoluminescence techniques in order to observe the influence of thermal annealing. XRD analysis revealed that the annealed ZnO thin films consist of single phase ZnO with wurtzite structure and show the c-axis grain orientation. Increasing annealing temperature increased the c-axis orientation and the crystallite size of the films. FESEM analysis of annealed thin films has shown a completely different surface morphology behavior. UV-vis has shown that the films were highly transparent with average transmission exceeding 80% in the visible range (400–800 nm). The measured optical band gap values of the ZnO thin films were around 3,24-3,28 eV. Photoluminescence spectra revealed the intensity of UV emission (NBE) increased with the annealing temperature.

Keywords : Spin-coating, Zinc oxide, Annealing, optical properties