

Investigation of the layer deposition time effects on physical properties of thin layers N:ZnO

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Abstract

In this study the thin films of N: ZnO were deposited on the glass substrates using the DC magnetron sputtering at 2×10^{-2} Torr working pressure in equal amount of Ar and N₂ as sputtering gases. Thickness, morphology, crystalline structure, and optical properties of the layers were detected in three different sputter deposition time. By increasing the deposition time, the thickness of the layers, the roughness of the surfaces, and the height of the grains increased. The hexagonal (wurtzite) N: ZnO structure layers have grown with high (002) textured structure. By doping of nitrogen in the crystal structure of N: ZnO, the lattice parameter, c, increased compared with pure ZnO. These layers had an optical band gap about 3.2 eV which increased as the thickness increased. This result was confirmed by photoluminescence spectra. The Raman spectrum confirmed the XRD results and the doping of nitrogen into the crystal structure of zinc oxide. The thickness of the layers was calculated by Swanepoel method, which was close to the thickness measurement.

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