

RF power dependence of ZnO thin film deposited by RF powered Magnetron Sputtering system

Abstract

This paper investigates the influence of RF power onto structural and optical properties of Zinc Oxide (ZnO) thin films. A series of ZnO thin films was prepared on the glass substrate by RF magnetron sputtering. ZnO is well known for various applications such as varistors, light emitting diode, gas sensor and much more. These applications are attributed to interesting material properties of a wide and direct band gap (3.37 eV) and high exciton binding energy (60 meV). X-ray diffraction (XRD), UV-Vis spectrophotometer and profilometer were used to check the effect of the different RF power on the structural and optical thin films. The increased of RF power resulted in the increase of the growth rate, where the film deposited at 175 W shows higher growth rate at 6.6 nm/m. All films are polycrystalline with (002) preferential orientation with high optical transparency approximately >80% in visible range. The intensity of film increase as the RF power increase but decrease for the film deposited at 175 W because the reaction rate at this power is very fast and cause the severe surface damage, resulting in the poor crystalline quality. The estimated band gap \approx 3.25 eV was obtained.