Structural and Optical Properties of ZnO and MgZnO Semiconductor Materials at Different Annealing Temperature ABSTRACT

Zinc Oxide (ZnO) and Magnesium Zinc Oxide (MgZnO) had received much attention in photoelectronic devices. The current study is performed to investigate the effect of temperature on the structural and optical properties of ZnO and MgZnO with 99.99% purity, deposited on Indium Tin Oxide (ITO) glass using Radio Frequency (RF) magnetron sputtering technique. The Argon flow into the chamber is 10 sccm with a deposition rate of 0.25 ± 0.1 kA/s, working pressure 4.5 x 10-3 Torr, gas and RF power of 100 watt. Structural analysis using X-Ray Diffraction (XRD) shows that when the temperature increase, the diffraction peak intensity and grain size increase while the deposition time at 30 minutes shows the best intensity. The grain size of ZnO and MgZnO is 0.362 nm and 0.195 nm at 3000 C respectively. This shows that the full width half maximum (FWHM) of ZnO is smaller compared to MgZnO. The optical transparency value from UV-Vis spectrophotometer is 78% for ZnO while MgZnO showing 80%. This shows that optical transmittance of MgZnO is slightly higher than ZnO.