

Abstract

Transparent conducting ZnO:Al thin films were prepared by reactive evaporation method in the Physics laboratory using An Edward Auto 306 RF/DC Magnetron deposition chamber. This was done at a temperature of 500K, current of 3.5A, pressure of 3.5×10^{-5} millibars and an oxygen gas flow rate of 20sccm/min. The optical and electrical properties of the films were then investigated at room temperature before and after annealing in argon atmosphere. The optical measurements were analyzed using scout 98 software by measuring the transmittance curves that were used to find the optical bandgap energy and thickness of the thin films. The band gap energy for the ZnO:Al thin films was found to lie between 3.28-4.20 \pm 0.05 eV. Electrical measurements of the thin films was done by four point probe method in which measurements were obtained using Keithley 2400 Source Meter interfaced with a computer using LabView program. The sheet resistivity at room temperature of 4% optimized ZnO:Al thin film was 24.42 \pm 0.05 $\hat{a}_{,,}$ |cm for unannealed film and 20.38 \pm 0.05 $\hat{a}_{,,}$ |cm for the 1500C annealed film. The optical and electrical properties of the films were found to have improved with Al doping and post deposition annealing in argon atmosphere.