Abstract

Copper oxide an intrinsic p-type metal oxide semiconductor has two stable forms namely cupric oxide CuO and cuprous oxide Cu_2O with a direct band gap of 1.2-1.9 eV and 1.7-2.9 eV~2.1 eV respectively with a high absorption coefficient. Together with low cost, nontoxicity, natural abundance of copper and a theoretical conversion efficiency around 20% in a single junction structure, Copper oxide is a good candidate for next generation solar cells. Creating highly conductive p-type Cu_2O thin films is essential to realize its optical properties for a viable solar cell material. In this thesis, magnetron sputter deposition of copper oxide thin films and the effect on silver (Ag) implantation on deposited copper oxide thin film is studied. The structural, optical and electrical properties of pulsed dc magnetron sputtered copper oxide thin films at various power (50-90 watt) and the implanted copper oxide thin film with different doses ($3 \times 10^{12} - 8 \times 10^{12}\ ions/cm^2$) have been investigated employing X-ray Diffractometer (XRD), Field Emission Electron Microscopy (FESEM), Energy Dispersive X-ray Spectroscopy (EDX), Optical Ellipsometry and Four point probe method. The outcomes indicated that varying power resulted in phase transformation of CuO to Cu2O. Optical properties showed the direct band gap in the range of 1.7 to 2.69 eV and the refractive index varies from 1.3 to 2.2. The lowest resistivity found at 90 watt about $1.7 \times 10^5\ ohm.cm$ .The band gap of silver ion implanted copper oxide thin films were reduced with increasing doses due to band tailing effect. The band gap was observed about 2.5, 2.3, 2.2, 2.9 eV for un-doped and silver doped copper oxide thin films at various doses 0, 3×10^{12} , 4×10^{12}, and $8 \times 10^{12}\ ions/cm^2$ respectively.