

Abstract:

Cu₂O thin films have been deposited using reactive dc magnetron sputtering technique using an Edward Auto 306 Magnetron Sputtering System. Transmittance and reflectance data in the range 300 nm-2500 nm were obtained using UV-VIS NIR Spectrophotometer Solid State 3700 DUV for all the thin films samples that were prepared. Transmittance values of above 70% were observed. The optical measurements were simulated using SCOUT 98 software to determine optical constants and optical band gap of the thin. The optical properties in these films were varied by varying oxygen flow rate at constant power of 200 W. Optical studies show a direct allowed transition and a shift in the optical absorption edge as the oxygen flow rate varies at constant argon flow rate and other deposition parameters. These results show that single phase Cu₂O thin films can be synthesized at a relatively low substrate temperature using the reactive dc magnetron sputtering technique. Band gap values of 1.62 eV – 2.54 eV is observed. The surface sheet resistivities at room temperature of 298 K were found to vary with the deposition parameters and film thickness. Urbach energy varied between 0.6×10^{-4} to 1.92×10^{-4} .