SOME PHYSICAL AND TOPOLOGICAL STUDIES ON PHTHALOCYANINE THIN FILMS-CuPc, CoPc and NiPc

ABSTRACT

The present investigations comprise of the studies on the electrical, optical, structural and topological characterizations of CuPc, NiPc and CoPc thin films. Powdered samples of spectroscopically pure CuPc, NiPc and CoPc obtained from Aldrich Chemical Company Inc., WI, USA are used as source material. Thin films are prepared at a base pressure of $10^{-5}$ m. bar using a Hind-Hivac thermal evaporation plant (Model No.12A4). Thicknesses of the films are measured using Tolansky’s multiple beam interference technique. The composition of the thin films was analyzed and confirmed using EDAX (JSM 5600LV, EDAX-INC (JEOL)). Electrical studies are performed using a programmable Keithley electrometer (model No.617). The effect of thickness, substrate temperatures and air annealing on the electrical conductivity are studied. Activation energies are calculated. The measurements are performed in a subsidiary vacuum of $10^{-3}$ m. bar. Optical characterizations of thin films were carried out with different film thickness, substrate temperatures and after air annealing at different temperatures. Absorption spectra of these thin films are recorded using Shimadzu 160A spectrophotometer. Band gaps are determined in each case. Structures of source powder and their thin films are studied by X-ray diffractograms (XRD) using BRUKER D5005 diffractometer. Lattice constants are determined. Topological characterizations of these thin films are done using LEO 435VP Scanning Electron Microscope (SEM).

Key words: - CuPc, NiPc, CoPc, XRD, SEM, EDAX, activation energy, band gap, structure and morphology.