

**S.p.12 NIRMALA PAUL—Investigations on the electrical characteristics of certain semi conductor films and polymerized para-toluidine films—1982—Dr. M.G. Krishna Pillai**

The thesis mainly deals with the studies of the preparation and electrical characteristics of compound semiconductor thin films of silver sulphide and ferric hydroxide and investigations of the electrical and dielectric properties of plasmapolymerized thin films of para-toluidine.

Compound thin films of both silver sulphide and ferric hydroxide have been prepared by chemical method involving an interfacial chemical reaction of a solution and a gas in a controlled fashion. Silver nitrate solution and hydrogen sulphide gas have been used to prepare n-type silver sulphide films. Ferrous sulphate solution and ammonia gas have been made to react to form ferric hydroxide films which are found to be amorphous on X-ray diffraction studies.

On investigating the electrical conductivity studies in the temperature range

303 K to 473 K, it is found that below 450 K ionic conduction is predominant in silver sulphide films. Ferric hydroxide films pictured an intrinsic conduction above 313 K and below 313 K an impurity conduction.

Polymer thin films of para-toluidine have been prepared in a radio frequency glow discharge from the monomer para-toluidine in a vacuum of the order of  $10^{-2}$  torr. A radio frequency oscillator of frequency approximately 4.5 MHz, fabricated, has been used as the power source for polymerization. A vacuum set up together with the plasma zone to suit the necessities of polymerization has been designed and fabricated using coming glass.

Infra red studies of the film proposed that the polymerization is by hydrogen abstraction and polymer units are linked with polar C-N bonds. Also the film suggest the presence of cross-links in them.

The current-voltage characteristics of the electrodeless glow discharge polymerized films sandwiched between aluminium electrodes showed ohmic conduction at low fields and square law region at high fields.

The dielectric studies of the films revealed temperature dependence of dielectric constant and dielectric loss and the variation of capacitance with film thickness at a fixed frequency of 1 KHz. The properties of these film were found to be comparable with high quality films.