SUMMARY

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Thesis Entitled

"Dielectric Relaxation and high field conduction studies of the chalcogenide glasses".

To study the temperature and frequency dependence of dielectric constant and dielectric losses particularly in the range where dielectric dispersion occurs which will help in understanding the nature and origin of the losses occurring in these materials. The field dependence of conductivity will be measured at different temperature on bulk samples as well as on vacuum evaporation thin films of chalcogenide glasses having different electrode separation. Thickness dependence of I-V characteristic of samples will confirm the presence of space charge limited conduction using the theory SCLC. Using this theory of SCLC, the density of localized states near the Fermi level will be calculated for various samples. Impurity effects in chalcogenide glasses may have importance in fabricating glassy semiconductors. The effect of metallic impurity and rare earth additives on electrical properties will be studied. The highly pure materials (99.999%) were used for preparing the amorphous materials. The quenching technique has been adopted. The dielectric properties of amorphous a-$Se_{96-x}Te_4Ag_x$, a-$Se_{70}Te_{30-x}Sn_x$, a-$Se_{96-x}Te_4Ga_x$ and a-$(Se_{80}Te_{20})_{100-x}Ge_x$ have been studied in the frequency range 120Hz to 100 kHz with varying the temperature. The capacitance and dissipation factor have been measured simultaneously. Dielectric constant and dielectric losses have been calculated by using the measured capacitance and dissipation factor.

The temperature dependence of dc conductivity of the above thin films has been used to calculate the activation energy and pre-exponential factor, which inferred that the conduction mechanism of charge carriers in the extended states. The SCLC mechanism holds validity in the above study. On increasing the concentration of impurity, the increase in dc conductivity and decrease in activation energy is due to decrease of localized states in the band gap. The SCLC mechanism holds validity in the above study. Addition of impurity into Se-Te system might decrease the chain and increases the rings of Se-Te, which in turn decreases the defect states (D+, D-). This is probably the reason that impurity atom decreases the localized states. As the electro negativity of the system decreases, the corresponding dc conductivity increase and the density of states decreases with the increase of silver concentration of the system.

Effect of SHI Irradiation on the Optical Parameter of Se-Te-Sn thin films has been studied. From the above discussion, one may conclude that the optical parameters such as absorption coefficient, extinction coefficient decreases and optical band gap increase with the Tin concentration into the Se-Te-Sn system. This is mainly due to the decrease the defect states in the mobility gap with the Tn concentration. On irradiation by Swift Heavy Ion, the defect states increase or decrease the grain size due to which optical band gap decreases. The absorption coefficient and extinction coefficient are also decreases after irradiation but it is maximum for 4% of Tin . At for 4% of Tin concentration, the optical band gap minimum for irradiated thin film, it may be due to increase the defects states or decrease the disorderness for this concentration.