Summary and Conclusion
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PS and iodine were dissolved in cyclohexanone. Iodine in different concentration was mixed with PS. Films of 20 μm thickness were grown on Al substrate by isothermal immersion technique. In this method of film preparation, no degradation of polymer chains take place. To investigate the electrode effect, films were also grown on Zn, Ni and Cu substrates. The substrate acted as an electrode and the other of Al of 1cm² was pressed on to the film in a laid-on electrode assembly. Four different studies of electrical conduction, dielectric relaxation, photo depolarization current and thermally stimulated discharge current were performed by employing the doped films.

Electrical conductivity was investigated by noting the transient behaviour of current and studying the effects of electrode material, film tickness and iodine concentration on the current-voltage characteristics at a constant temperature. Conductivity was also determined by measuring the current when the film was heated at a constant rate of 1°C per minute and applying a fixed voltage. Absorption current has been explained
on the basis of trap filling mechanism. Electrode dependence of current voltage invokes charge carrier injection from electrodes. Charge transport suggests hopping mechanism. Space charge limited conduction is found to be operative. Increase in conductivity due to iodine loading is attributed to the enhancement in carrier mobility.

Dielectric properties were investigated by measuring the capacitance and loss tangent as a function of temperature, frequency and iodine concentration. No change in capacitance with frequency suggests that polarization settles in very short time. Increase in capacitance with temperature is assigned to ionic polarization. Incorporation of increased concentration of iodine increases formation of charge transfer complexes. Dielectric loss maxima is connected to the motion of molecular chains.

Photo depolarization current was investigated by varying the polarizing time, polarizing voltage iodine concentration and electrode material. The current decay mode is found to be hyperbolic rather than exponential. Electrode effect supports charge injection from electrodes.
Thermally stimulated discharge current study was conducted by varying the polarizing voltage iodine concentration and electrode material. Presence of iodine in the polymer facilitates polymer chain motion and enables the electret to store more charge. Space charge polarization is enhanced due to doping. Charges are injected from electrodes.

In short it may be argued that electret forming characteristics of polystyrene can be greatly improved by doping it with iodine. Charge transport in molecularly dispersed systems can be visualized as transition of an electron from a neutral molecule to the neighboring "molecularcation" (hole transport) or from the "molecular anion" to a neighbouring neutral molecule (electron transport). The term "Molecular ion" is used quite freely in this context. It includes the situation where the charge is bound rather loosely on the transport molecule and spreads substantially over neighbouring matrix molecules.

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