

## Phase behaviors and ionic conductivity of Polymer electrolyte/Ionic liquids systems

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Thermal analysis of poly(ethylene glycol)(PEG) with an Ionic liquid(1-ethyl-3-methylimidazolium hexafluorophosphate [emim][PF<sub>6</sub>]) has been carried out at various temperatures and compositions. Thermo-optical analysis and differential scanning calorimetry have been used to collect data necessary for the phase diagrams. A thermo-optical analysis technique is used to determine the melting points of polymer/ionic liquid system. The melting point depression phenomena are observed to be explicable in terms of the amorphous region with crystalline region. A thermodynamic model appropriate to describe the crystalline-amorphous phase in semicrystalline polymer is used the double lattice(Chang et al)-nonrandom-Pitzer-Debye-Huckel(CDL-NR-PDH)model. The obtained results show that sequence type of polymers play a great role in determining eutectic points of the given systems. To describe the segmental motion of the polymer chain, the effective co-ordinated unit parameter is introduced. The obtained co-ordinated unit parameter for each phase diagram results is used to describe the behavior of the ionic conductivities of the given systems. Good agreement is obtained upon comparison with experimental data of various PEG and ionic liquid systems.