CHAPTER VI
CONCLUSIONS

6.1 Electrocrheological Properties of SIS

In our work, electrorheological properties of styrene-isoprene-styrene triblock copolymers were investigated by examining the effect of morphology on the dynamic storage modulus (G'), under oscillatory shear mode. The experiments were carried out with electric field strengths of 0, 1 and 2 kV/mm, with temperature and frequency sweep mode. In our SIS material systems consisting of spherical (D1114P), cylindrical (D1164P), and lamellae (D1162P) systems, their storage modulus exhibit linear increases with increasing temperature beyond 330 K at 1 rad/s. Moreover, the responses are higher at the electric field 1 kV/mm. The increases in the storage modulus response can be traced back to the rising temperature which tends to increase the dielectric constant, and the effect of applied electric field which induces the electrical network within the SIS matrix.

6.2 Deflection Measurement of SIS Films

From the deflection measurement, the deflection distances of D1114P and D1164P increase stepwise with increasing of electric field along with corresponding dielectrophoretic forces, while D1162P shows no deflection response. When electric field induced force is not high enough to overcome the resisting elastic force the film shows no response. This is apparently the case of D1162P system which has the hard lamellae morphology, whereas the spherical morphology of D1114P shows the greater response than the others.

6.3 Electrorheological Properties of DePDPA/SIS Blends

The electrorheological properties of styrene-isoprene-styrene triblock copolymer with 19 %PS, D1114P and De_PDPA/D1114P blends, were investigated at electric field strength varying from 0, 1, and 2 kV/mm. De_PDPA was synthesized

through the interfacial oxidative polymerization and then dedoped by ammonium hydroxide solution. The storage modulus response ($\Delta G'$) increases beyond the concentration of 5 %vol De_PDPA at an applied electric filed strengths of 1 and 2 kV/mm. However, the sensitivity is reduced at the high concentration, where the effect of electric field induced inter-particle interaction is strongly hampered by the increase in the storage modulus (G'_o). Under temperature sweep, the response of 20 %vol at 1 kV/mm decreases after reaching the maximum via increasing temperature, in which the storage modulus (G'_o) of the thermoplastic elastomer matrix is also reduced. Similar results also occur for the 20 and 30 %vol blends under the electric field strength of 2 kV/mm.

6.4 Storage Modulus Temporal Response of DePDPA/SIS Blends

The G' temporal responses, of the polymer blend systems of 20 and 30 %vol De_PDPA, show a reversible bahavior under applied electric field strength of 2 kV/mm. While the 10 %vol blend appears to be an irreversible system. This is due to dipole bondings between adjacent De_PDPA particles and residual dipole moments inducing permanent inter-particle interactions. The bending response was observed by measuring the deflection distance.

6.5 Deflection Measurement of DePDPA/SIS Blends Films

For pure D1114P and the blends, the response and force increase stepwise under electric field. The response and calculated force increase with increasing particle concentration up to 10 %vol and then decrease at the concentration higher than 10 %vol.