CHAPTER VI
CONCLUSIONS

In the present study, poly(ethylenedioxy thiophene)/poly(styrene sulfonic acid) (PEDOT/PSS) was synthesized via chemical oxidative polymerization by using sodium persulfate as an oxidant and blended with poly(dimethyl sulfoxide) (PDMS). Electrorheological properties of pure PDMS and PDMS_ PEDOT/PSS blends were investigated by examining the effects of PEDOT/PSS particle concentration on the storage modulus, G', under the oscillatory shear mode at electric field strength various from 0 to 2 kV/mm. In pure PDMS systems, the storage modulus (G') increased with increasing electric field strength. For the electrorheological properties of PDMS_PEDOT/PSS blends, with the PEDOT/PSS particle concentrations of 5, 10, 15, and 20 vol%, the storage modulus, G' of polymer blends, were generally higher than those of pure PDMS due to PEDOT/PSS particles within the matrix acting as fillers; they can store or absorb the forces/stresses within the matrix. The storage modulus responses increased with electric field linearly within the range of 0.002-1 kV/mm. This can be attributed to the PDMS and PEDOT/PSS particles became polarized and induced dipole moments were generated, leading to intermolecular interactions along the direction of electric field. The storage modulus sensitivity, $\frac{\Delta G'}{G'_0}$, attained a maximum G' sensitivity values of 8%, 4%, 10%, and 9%, at particle concentrations of 5, 10, 15, and 20 vol% at the electric field strength of 2 kV/mm, respectively.

The electrorheological properties of second doping PEDOT/PSS, were investigated by examining the effects of PEDOT/PSS/EG particle concentration on the storage modulus, G', under the oscillatory shear mode at electric field strength various from 0 to 2 kV/mm. In PDMS_PEDOT/PSS/EG systems, the storage modulus (G') increased with increasing electric field strength, with the PEDOT/PSS/EG particle concentrations of 5, 10, 15, and 20 vol%, the storage modulus, G' of each polymer blends, were generally higher than those of pure PDMS due to PEDOT/PSS/EG particles within the matrix acting as fillers; they can store or absorb the forces/stresses within the

matrix. The storage modulus responses increased with electric field linearly within the range of 0.002-1 kV/mm. This can be attributed to the PDMS and PEDOT/PSS/EG particles became polarized and induced dipole moments were generated, leading to intermolecular interactions along the direction of electric field. The storage modulus sensitivity, $\frac{\Delta G'}{G'_0}$, attained a maximum G' sensitivity values of 8.7%, 9.0%, and 15.2%, at particle concentrations of 5, 10, and 15 vol% at the electric field strength of 2 kV/mm, respectively.