CHAPTER V

CONCLUSIONS

In this work, electromechanical properties of poly(ε-caprolactone) films and poly(p-phenylene)/poly(ε-caprolactone) were investigated by studying the effect of crosslinking ratio of PCL by using BPO as a crosslinking agent and the effect of embedded PPP particle concentration on the dynamic moduli, storage modulus response and storage modulus sensitivity. For the effect of crosslinking ratio, the highest storage modulus response and storage modulus sensitivity belong to 3%wt BPO cPCL, that can be explained by two synergized effects, the reduction of initial storage modulus compared with the neat PCL and the polarizable group, carbonyl groups and oxygen atoms in the PCL chain will not damaged by the overbundant BPO. For the PPP/PCL system, the highest storage modulus response and the storage modulus sensitivity belong to 30:1 dPPP/3% wt BPO cPCL. For the effect of PPP concentration in the composite, the storage modulus response and storage modulus sensitivity are significantly decrease at the very low concentration of PPP (0.01% v/v) which can be explained that PPP particle will behave as a filler and the increase of initial storage modulus respectively. However, these values start to increase when increasing the concentration of embedded PPP to 1.0% v/v which can be attributed to the synergized dipole moment induction between sufficient PPP particle and polarizable groups in the PCL chain. In case of the deflection experiment for the shape memory behavior, Both of PCL and PPP/PCL systems bend towards the positive or anode side under applied electric field. This actuation effect is due to the electronic polarization by the carbonyl group and the lone-pair electrons in the oxygen atom, including the $FeCl_4^-$ counterion obtained from the embedded dPPP in the composite system. The deflection angle, the induction time, the recovery time and dielectrophoresis force of the samples increase directly proportional to the electric field strength from 0 to 500 V/mm.