CHAPTER VI

CONCLUSIONS

6.1 Conclusions

In our work, electromechanical properties of pure EPDM elastomers and polymer blend between doped-permethylpolyazine and EPDM were investigated, which started with studying the effect of electric field strength and temperature of pure EPDM elastomers on the dynamic storage modulus (G′) under oscillatory shear mode. The experiment were carried out at electric field strength varying from 0 to 1 kV/mm in frequency and temperature sweep test modes. In our pure EPDM elastomers, there are unsaturated structures on the side chain which can induce electrical dipole moments, the storage modulus response (ΔG′) and sensitivity ($\Delta G'/G'_0$) increase with increasing both electric field and temperature between 300 K and 380 K at all frequencies examined and high frequencies, respectively; the latter effect is due to entropic contribution of elastomeric matrices. The dielectric constant of EPDM, NORDEL IP 5565 is the highest because of more unsaturated structures on the side chains which can generate more dipole moments. Hence, we selected the EPDM, NORDEL IP 5565 as matrix phase. The electromechanical properties from blends of EPDM NORDEL IP 5565 grade/ highly D_PAZ blends were investigated through examining the effect of electric field strength varying from 0 to 1 kV/mm in frequency sweep test modes and highly D_PAZ particle concentration varying from 0 to 20vol.% on the dynamic storage modulus (G′) under oscillatory shear mode. In our polymer blends, the storage modulus (G′) increases with electric field. The storage modulus response (ΔG′) and sensitivity ($\Delta G'/G'_0$) also increase with electric field and attain a maximum value of 3.14×10^{-5} Pa, and 1.125, respectively as electric field strength is applied, the alignment of electrically polarized particles between electrodes were generated leading to the induced dipole moments. For the latter effect, ΔG′ and $\Delta G'/G'_0$ increase with particle volume fraction and attain a maximum value of 3.14×10^{-5} Pa, and 1.125, respectively at particle concentration of 20vol.% highly D_PAZ. The mechanism for the storage modulus response is the interaction

between electrically polarized particles which induced electrostatic force. The dielectric constant of polymer blend that have 20vol.% of particle volume fraction is the highest because there are more content of dispersed particles on EPDM NORDEL IP 5565 matrix which can generate more dipole moments and the interaction become strong as the dipole moments are close to each other.