CHAPTER V
CONCLUSIONS

The compatibilizing activity of maleic anhydride in LLDPE/NR blends has been studied in detail. Both the morphology and dynamic mechanical properties of LLDPE/NR blends have been investigated. The effect of maleic anhydride on the dynamic mechanical properties was investigated in the temperature range −100 to +40°C. These investigations indicate that the LLDPE/NR blends are incompatible, as shown by the presence of two relaxation peaks corresponding to T_g's of LLDPE and NR. The addition of 5% wt maleic anhydride was found to improve the compatibility of LLDPE/NR blends, as shown by the presence of a single glass transition peak. SEM micrographs of the blends confirm the heterogeneous nature of these blend systems. The addition of a few percent of the compatibilizer to the blends was found to reduce the size of the dispersed NR phase followed by a leveling off at higher concentrations, indicating the presence of interfacial saturation concentration. SEM analysis of the fracture surfaces of the compatibilized blends showed improved interfacial interaction between the phases. At high shear rates, the morphology of NR dispersed phase stabilized by the presence of compatibilizer. Morphology of the blends is strongly dependent on NR loading and viscosity ratio which is varied with shear rate. Drop breakup and coalescence influence the final size of NR dispersed phase.

The rheological properties of LLDPE/NR blends system with and without the addition of compatibilizer have been studied. The viscosity of the blends decreased with increase in shear rate (or shear stress) indicating pseudoplastic nature of the systems. The viscosity of LLDPE/NR systems reveals positive or negative deviations from the additivity rule depending on the blend content. Melt viscosity increases with the addition of maleic

anhydride indicating high interfacial interaction. The compatibilizer increases the adhesion between the LLDPE and NR phases. The temperature dependence of viscosity was studied. The viscosity decreased with increasing the temperature following to the Arrhenius equation. Melt viscosity increase with amount of filler and the effect is more pronounced at low shear rate. The melt elasticity of these blend systems was also studied. Addition of NR enhances elastic modulus. The addition of maleic anhydride is found to increase storage modulus and die swell value of the blends. Die swell is found to depend on temperature, shear rate and amount of NR. At a higher concentration of the compatibilizer the melt elasticity decreases due to interfacial saturation. Storage and loss modulus master curves of these blends were constructed. It was found that the time-temperature superposition was not applicable for these blend systems due to the changing in morphology.