CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

The success of the admicellar polymerization of polypyrrole coated latex particles was investigated by using FTIR, SEM, TGA, and DMTA. From the FTIR study, the admicelled rubbers showed the characteristic peaks of polypyrrole which confirmed the existence of PPy after the polymerization. The SEM micrographs revealed the evenly coating of PPy over latex particles and they showed no phase separation of PPy and NR as well. By the results of TGA, the admicelled rubbers began to lose weight at higher temperature compare to that of NR and they also showed the shift of major decomposition of pure PPy to higher temperature. The DTG curves also demonstrated the increase of char yields of the admicelled rubbers. As PPy content increased, the residual remaining enhanced and the degradation of the admicelled rubber was slow down as well. These indicated that the admicelled rubbers were more thermostability than natural rubber. The mechanical properties of the admicelled rubbers were investigated by using DMTA and tensile testing. DMTA results showed only one T_g of the admicelled rubbers in between the T_gs of pure rubber and pure PPy. This suggested that the admicellar polymerization was a unique method to prepare a well miscible core-shell structure of PPy-NR. The mechanical properties from tensile testing showed the increase of Young's modulus of the admicelled rubbers. This indicated the higher stiffness of the admicelled rubbers compared to natural rubber. Since PPy behaves like hard and brittle material, the stiffer of the materials increase as PPy content increases. The results of conductivity measurement revealed that addition of salt improved the conductivity since salt decreased electrostatic repulsion between headgroups, which allowed more adsorption and adsolubization leading to homogeneous coating of PPy over rubber surface. The increase of PPy content enhanced the conductivity because the coating of PPy was more perfectly at higher concentration supported by SEM micrographs. The study of effect of monomer to initiator ratio on the conductivity indicated that [Mo]:[In] = 1 showed the highest conductivity and the conductivity decreased with the increasing of [Mo]:[In] ratio to 3. Since it was the radical polymerization, the higher initiator concentration, the more radicals generated. Thus, higher molecular

weight of PPy was obtained resulting in higher conductivity. The conductivity of the stretched admicelled rubbers at different distance was investigated. It demonstrates that the conductivity increased with low strain due to the improvement of alignment of polypyrrole but the conductivity decreased significantly when continuing to stretch the film to large strain, since the particle contacts and the path ways of charge carrier were disconnected.

The recommendations for the future work were described below.

The content of pyrrole monomer should be increased to higher weight percent.

The effect of heating on conductivity of stretching rubber should be studied.

The rheology behavior of the admicelled rubbers should be studied.