

## CHAPTER VI

### CONCLUSION AND RECOMMENDATION

Optical microscope and TEM images showed core-shell structure of synthesized particles. Extracted shell polymer of synthesized particles showed IR spectrum with characteristic of PCL and PLA, and also showed spectra pattern of block copolymer. These results can be concluded that core-shell of natural rubber can be achieved via admicellar polymerization, and shell material was PCL-PLA block copolymer. Otherwise, thermal stability of rubber particles also was improved;  $T_d$  of admicelled particles was higher than natural rubber particles. Variation of CL to LA ratio and initiator to monomers ratio did not show significant effect on particle size, chemical function and degradation temperature.

PLA/admicelled rubber blends have their glass transition temperature shifted toward those of PLA and natural rubber. Organoclay content showed effect on  $T_g$  shift. Organoclay content at 1.5% showed greater shift of both  $T_g$  toward each other that suggested organoclay contributes better reinforcement to blends. Monomers ratio of core-shell particles affected morphology of blends; large rubber domains were clearly observed when caprolactone component was increased. Initiator to monomers ratio affected toughness, which was indicated with impact strength. Toughness of PLA/admicelled rubber blends increased when the ratio was increased until ratio exceeded 1.5:100 that showed decreasing of impact strength. Impact testing results conclude that PLA/admicelled rubber blends showed higher toughness than neat PLA. Initiator to monomers ratio caused increasing impact strength by increasing compatibility between PLA and rubber phases. But clay generated brittleness or reducing impact strength to PLA. CL-LA ratios did not alter toughness of PLA.

#### **Recommendations**

1. Synthesis of admicelled rubber took too long time. Following admicellar polymerization steps, the early steps, admicellar formation, solubilization and polymerization, were spent time within 48 hr to achieve. But, washing that is last step was completed with time about 5-7 days.

2. Admicelled particles were hard to keep in latex form, because they tended to agglomerated and became rubber bulk.

3. Organoclay was used at low content in blends. So, it was hard to be detected in cryo-fracture surface with SEM.

4. Blends with high clay content showed brittleness that caused problem for specimen preparation.