CHAPTER VI

CONCLUSIONS

The brittleness of PLA was improving by ring-opening polymerization of lactide monomer and grafting from ENR to obtain high molecular weight and good mechanical and thermal properties of PLA. The graft copolymer was successfully synthesized confirmed by FTIR spectra corresponding to the strong peak at 1740 cm^{-1} of carbonyl group in PLA chain and the broad peak at 3400 cm^{-1} attributed to hydroxyl group. The highest yield of copolymer and M_w were 89.88% and 27,816 g/mol, respectively. The temperature of mixing and content of catalyst were both important parameters affecting the yield of copolymer, M_w, and MWD. The optimum temperatures of mixing and the catalyst concentration were 160 ^oC and 0.2 wt% of $Sn(Oct)_2$, respectively. The grafting percentage of ENR on PLA was approximately 24% with 20 wt% of the ENR. In addition, the DSC thermogram points out that glass transition temperature and %crystallinity tended to decrease because ENR obstructed the crystallization of PLA component. Furthermore, the thermo-mechanical results by DMA reveal that the introduction of ENR content improved flexibility of PLA chain observed by the decrease in storage modulus. for mechanical property, impact strength shows the greater value after adding ENR but their values are insignificantly different over various ENR content. However, the maximum ENR content is 15 wt%. Moreover, for the tensile test showed the Young's modulus is the same trend as the strorage modulus from DMA. The elongation of copolymer was improved compared to pure PLA. Finally, the morphology of copolymer was investigated by FE-SEM which obviously revealed the well-dispersed ENR in PLA matrix. In conclusion, with the improved thermal and mechanical properties of the obtained materials by ENR graft copolymerization, the greater flexibility of materials was gained for the ease of injection moulding process.