



CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Poly(D,L-lactide) (PDLLA) was improved the properties by blending with Poly[(R)-3-hydroxybutyrate-co-(R)-3-hydroxyvalerate] (PHBV) and poly(ethylene glycol) (PEG1000), which were also developed in antimicrobial efficiency by adding silver nitrate (AgNO_3) of various amount (0.2-0.4%). The occurrence of silver nanoparticles was by a direct reduction of silver ions by using PEG1000. The suitable composition of polymer blends before adding AgNO_3 is 50PLA/50PHBV and 30% PEG1000 w/w of PDLLA/PHBV. All of polymer blends were spun to be fiber by melt-spinning technique.

The PDLLA/PHBV showed the immiscibility in all composition because of the presence of two distinct glass transition (T_g). After that 50PDLLA/50PHBV was added by PEG1000, it was compatible with the PDLLA/PHBV matrix as evidenced by a single, composition-dependent of T_g , T_{cc} and T_m of each polymer. For The addition of AgNO_3 , only T_c of PHBV slightly increased. It is the results from the obstruction of silver nanoparticles to crystallization of polymer blends.

For TGA data, Neat PDLLA was more thermally stable than neat PHBV and TGA curves comprising of those neat components showed two degradation steps. The addition of PEG1000 caused a shift of the onset temperature to a lower temperature but the thermal degradation temperature (T_d) of later thermal weight-loss stage shifted to a higher temperature. For silver nanoparticles, it caused a higher T_d of this blend.

The addition of PHBV and PEG1000 caused an increase in elongation at break from 3.7% for PDLLA to 413.8% for PDLLA/PHBV/PEG1000 while the addition of silver nanoparticles reduced this property. The UV-visible absorption peaks at 416 nm showed the reduction of Ag ions into metallic Ag nanoparticle which was increased with time and these peaks not shifted in wavelength indicating that the average size of the Ag nanoparticles was not increased with increasing time. The antibacterial results showed that it can against *E. coli* and *S. aureus* and can release Ag ion for more than 18 days.