Thanainun Soonthornwatanasiri 2011: Cellulose-Based Fiber from Rice Straw Reinforcement of Polylactic Acid Biocomposites. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Associate Professor Cholticha Noomhorm, Ph.D. 96 pages.

A series of biocomposites from combination of biodegradable poly(lactic acid) (PLA) matrix and biodegradable lignocellulosic rice straw varying from PLA/rice straw = 95:5, 90:10, 85:15 and 80:20 wt% were prepared. Two particle sizes of rice straw were used in this study which are STL (particle size ≥425 μm) and STP (particle size ≤250 μm). From the morphological studies by scanning electron microscopy (SEM) showed that both PLA/rice straw biocomposites still remain as single fiber and no voids around PLA matrix, but only STL rice straw pullout was oberved. These indicated that there is an adhesion between PLA matrix and STP rice straw but no adhesion between PLA matrix and STL rice straw. The impacts of the rice straw content and particle size on the mechanical properties of the biocomposites were investigated. It was found that tensile modulus and elongation at maximum load of both PLA/STL and PLA/STP biocomposites was increase, whereas the tensile strength of PLA/STL was slightly decrease and PLA/STP was increase by adding the rice straw. Thermal stabilities of both biocomposites were investigated by thermal gravimetric analysis (TGA) and differential scanning calorimeter (DSC). Both PLA/STL (T_g = 60-62^{o}C and T_m = 149-150^{o}C) and PLA/STP (T_g = 60^{o}C and T_m =150-152^{o}C) biocomposites had the same trend of glass transition (T_g) and melt temperature (T_m) as pure PLA (T_g = 61.9^{o}C and T_m = 152^{o}C) but slightly lower than melt temperature of pure STL (T_m = 173.5^{o}C) and STP (T_m = 165.9^{o}C) rice straw. In addition, an exothermic crystallization temperature (T_c) peak at about 106-116^{o}C for both PLA/rice straw (STL and STP) showed that rice straw fibers can act as nucleating agent and attribute for the crystalline reorganization during heating on the PLA matrix. TGA thermogram showed that the PLA matrix degradation temperature and the corresponding onset temperature decrease when the rice straw content increase. Although the weight loss of both biocomposites decreases with an increase of both rice straw fiber content. However, the degradation temperatures of both PLA/rice straw biocomposites are in between the values of both PLA (345^{o}C) and rice straw (STL= 286^{o}C and STP = 311^{o}C) components.

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