Characterization of Poly(lactic acid)/ Maleic Anhydride-Grafted Poly(lactic acid)/Cellulose Nanowhisker Composites

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PLA softens at lower temperatures compared to other commodity polymers. Therefore, in this study, cellulose nanowhiskers (CNWs) were prepared from microcrystalline cellulose by acid hydrolysis and used as reinforcing nanofillers for PLA. To improve interfacial adhesion between PLA and CNWs maleic anhydride (MA)-graft PLA was prepared by melt-blending and used as a compatibilizer for the PLA/CNW green composites. And to improve thermal properties of CNW/PLA composites used nano reinforcements. The structure of the CNWs was investigated by TEM. Physical properties of the PLA/CNW composites were investigated by UTM, izod impact tester, DSC, TMA, and DMA. SEM images for the fractured-surfaces of the CNW/PLA composites gave important information on the fracture mechanics of the CNW/PLA composites. The best compositions and processing conditions for the PLA/CNW green composites were determined, and the effects of MA-grafted PLA and nano reinforcements on the performance of the composites were elucidated.