Abstract

The present work deals with the elaboration of nanobiocomposite composed of a cellulose derivative matrix reinforced by cellulose nanocrystals. First, thermoplastic cellulose matrix was obtained by cellulose esterification with lauroyl chloride. Cellulose nanocrystals (NCC), as reinforcement, were obtained by sulfuric acid hydrolysis of cellulose and characterized by AFM. Surface of cellulose nanocrystals (NCC) was then modified by lauroyl chloride in toluene (non swelling solvent), before being used as reinforcing elements in nanobiocomposite. Both cellulose modification and NCC surface modification were proved by different characterizations techniques: FT-IR, contact angle measurements, elemental analysis and thermogravimetric analysis (TGA). Successful surface modification has been shown with rather high degree of substitution (DS). Structural changes of NCC were checked by X-ray Diffraction analyses. Nanocomposites with surface modified and unmodified cellulose nanocrystals as reinforcements were elaborated by casting process. Thermal post-treatment has been performed to “melt” the cellulose derivatives interface. Homogenous nanocomposite films were obtained by film casting process when NCC was grafted, whereas unmodified NCC did not yield the same result. Thermal and mechanical properties were performed with DMA. When NCCs were grafted and thermopressed with the matrix, positive results were obtained proving the efficiency of this new compatibilization process by interface “melting”