CARBOXYLATED-CELLULOSE NANOCRYSTALS PRODUCED FROM LIGNOCELLULOSIC SOURCES AND USED AS BARRIER COATING FOR PET FILMS

CRISTALLI DI NANOCELLULOSA CARBOSSILATI DA MATRICI LIGNOCELLULOSICHE E LORO USO COME LACCA BARRIERA DI FILM DI PET

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The obtainment of Cellulose nanocrystal (CNC) from different cellulosic sources recently gained a great attention due to their physical and mechanical properties. CNC can be extracted from variety of bio-based and renewable sources, such as wood, cotton, bacterial cellulose, tunicate cellulose and softwood cellulose and used as reinforced nanocomposites, functional materials and oxygen-barrier layers. The most important factor affecting the nanocellulose production is the relative proportion of cellulose, hemicellulose, and lignin in the source material. The extraction of CNC from cellulosic materials started with a pre-treatment of biomass involving the complete or partial removal of hemicelluloses, lignin, etc. and isolation of cellulose component. After the separation of matrix materials, controlled hydrolysis of the cellulosic fibers is performed in order to produce colloidal suspensions of cellulose crystals. Using of ammonium persulfate (APS) has recently achieved the obtainment of CNC from different cellulose sources without any pre-treatment. APS, a strong oxidizing agent with high water solubility, is able to produce carboxylated CNC having high crystallinity and active carboxyl groups. The conversion of the carboxylic acid groups to the carboxylate form offers active sites for surface modification and templates for the synthesis of nanoparticles. Incorporation of carboxylated–CNC as a functional layer on different substrates have enhanced the barrier (oxygen permeability), mechanical, optical, and antifog properties of the nanocomposites. The aim of this work was to obtain the CNC from two lignocellulosic sources and to characterize them in terms of morphology, crystallinity, charge density and coating properties in order to use CNC as barrier coating for PET films.