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Enzyme Treated CNF Biofilms: Characterization

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Abstract

The objective of this study was to characterize on the chemical, mechanical, electrical and thermal properties of nanofibrillated cellulose based polyvinyl alcohol (PCNF) and silica (SiCNF) films obtained from Pulpzyme HC 2500 enzyme treated and Celluclast 1.5 L enzyme treated kraft-$NaBH_4$ pulps. Morphological alterations were monitored with SEM. Thermal stability, chemical characterization and crystallization were determined using TGA and FT-IR. Young's and storage moduli of the films were determined via a universal testing machine and DTMA. Dielectric properties were evaluated using an impedance analyzer. In the PCNF films, new vibrations and chemical shifts were observed. The crystallinity values of the SiCNF films calculated from the FT-IR were in agreement with the TGA results, revealing that the lowest crystallinity value was in the SiCNF. The higher Young modulus and elongation at break value were obtained in the neat the CNF films while the lowest values were observed in the neat SiCNF films. However, the SiCNF films revealed higher thermo-mechanical property. The PCNF and SiCNF films exhibit more visible dielectric behavior than that of the neat CNF films. Higher thermal stability, thermo-mechanical and mechanical properties were determined in the Pulpzyme HC 2500 enzyme treated films.

Keywords: Nanofilms; enzyme effect; chemical properties; thermo-mechanical properties