ABSTRACT

Cellulose Nanofibrils from Sugarcane Bagasse as a Reinforcing Element in Polyvinyl Alcohol Composite Films for Food Packaging

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Due to a high aspect ratio and enhanced mechanical strength, cellulose nanofibrils can be used as reinforcing elements in biocomposite films. In this study, cellulose nanofibrils were isolated from sugarcane bagasse using TEMPO-mediated oxidation and used to reinforce polyvinyl alcohol (PVA) films. The carboxyl group content, functional groups, crystallinity, thermal properties, and morphology of the nanofibrils were investigated. The influence of TOCNF content on the transmittance, swelling, and tensile strength of PVA-TOCNF films were investigated by varying the TOCNF content of PVA films. The fibrils had a carboxyl content of 12.2 ± 0.6 mg/g CE due to the presence of carboxylic groups, an increased degree of crystallinity, and highly porous nanofibrils with lengths between 150 nm and 600 nm. Incorporation of the isolated fiber on PVA films increased the swelling capacity, tensile strength, and UV absorption but a decrease in the solubility of the composite. An increase in the TOCNF content increased the tensile strength of the films with the highest tensile strength of 6.6 ± 2.2 kPa being observed when the TOCNF content was 30%. The improvement in films properties implies that the films can be used as a packaging material due to enhanced water absorption and light-barrier properties.

Keywords: Cellulose, tempo, characterization, morphology