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Grass waste derived cellulose nanocrystals as nanofiller in polyvinyl alcohol composite film for packaging application

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Abstract

Cellulose nanocrystals (CNCs) have shown remarkable application prospects due to their outstanding chemical and physical properties. In this research, cellulose nanocrystals were isolated from grass waste using alkali, bleaching and acid hydrolysis treatments and further used as nanofiller in polyvinyl alcohol (PVA) films. The valorisation of the grass waste, as an eco-friendly and sustainable low-cost precursor yields ~23.3% of CNCs. The morphology of the CNCs was observed under transmission electron microscopy and the influence of the grass waste derived CNCs (gw-CNCs) content on the optical transmittance, and water uptake and absorption capacity were investigated by varying the CNCs content in the PVA films. The results showed that the UV transmittance, and water uptake and absorption capacity of the composite films decreased with increasing of gw-CNCs content. The optimum gw-CNCs content for the composite film was determined in this study. The enhanced characteristics contributed to the UV shielding and water absorption properties implies the potential of the gw-CNCs to be used as potential nanofiller for packaging application . © 2021 Trans Tech Publications Ltd, Switzerland.

Author keywords

Cellulose nanocrystals ; Composite ; Grass clippings; Grass waste ; Nanofiller ; Nanomaterials; Packaging

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