A comparison of partially acetylated nanocellulose, nanocrystalline cellulose, and nanoclay as fillers for high-performance polylactide nanocomposites - DTU Orbit (24/12/2018)

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Partially acetylated cellulose nanofibers (CNF) were chemically extracted from sisal fibers and the performance of those CNF as nanofillers for polylactide (PLA) for food packaging applications was evaluated. Three PLA nanocomposites; PLA/CNF (cellulose nanofibers), PLA/CNC (nanocrystalline cellulose), and PLA/C30B (CloisiteTM 30B, an organically modified montmorillonite clay) were prepared and their properties were evaluated. It was found that CNF reinforced composites showed a larger decrease on oxygen transmission rate (OTR) than the clay-based composites; (PLA/CNF 1% nanocomposite showed a 63% of reduction at 238C and 50% RH while PLA/C30B 1% showed a 26% decrease) and similar behavior on terms of water vapor barrier properties with 46 and 43%, respectively of decrease on water vapor transmission rate at 238C and 50% RH (relative humidity). In terms of mechanical and thermomechanical properties, CNF-based nanocomposites showed better performance than clay-based composites without affecting significantly the optical transparency.

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