

Preparation and properties of starch nanocomposites

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The substitution of synthetic polymers coming from the petroleum by biodegradable polymers has been extensively studied.^[1] The need to obtain a material that has the same or even some similarity to the properties and characteristics of synthetic polymers is of great importance, both for industries seeking a material more "green", as also of extreme importance to the middle environment that is not saturating the waste polluters in its middle. A material that presents promising for this substitution is the thermoplastic starch (TPS).^[2] Coming from renewable sources, the raw material is found in abundance, has low cost and easy processing.^[3-4] Although the qualities, the TPS has some limitations such as its low mechanical strength compared to synthetic polymers and their sensitivity to water. One alternative to improve these properties is the incorporation of cellulose microfibrils to TPS, thus forming a nanocomposite. In this work, nanocomposite of TPS as matrix reinforced with cellulose microfibrils produced from eucalyptus Kraft wood pulp were prepared. The processing of the material was performed in a 16 mm L / D 40single screw extruder, with temperatures ranging from 110-130 ° C. The produced composite materials were characterized for their physical, mechanical, thermal, morphological and capacity of water absorption via infrared spectroscopy (FTIR), water absorption, mechanical testing, atomic force microscopy (AFM) and scanning electron microscopy (SEM-FEG). The dispersion of the nanofiber in the matrix was confirmed and the mechanical and thermal properties were improved showing the effectiveness of nanofibrils reinforcement.

Keywords: Nanocomposites, cellulose nanofibers, thermoplastic starch

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