Preparation and characterization of chitosan / montmorillonite (MMT) nanocomposite systems

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Abstrak

ABSTRAK
A natural-based nanocomposite film consisting of chitosan, montmorillonite (MMT) and cashew nut shell liquid (CNSL) was synthesized. The nanocomposite was prepared by mixing a suspension of clay particles (filler, MMT) with a solution containing chitosan as the macroscopic polymer matrix. In this study, it was proposed that non-ionic long-chain alkyl
molecules with possible interact ions with the amine group of chitosan could be used as a plasticizer. As a natu-ral source for these compounds, an extract of CNSL was used. A series of chitosan/MMT com-posite samples containing two different clay contents and a sample with an additional CNSL were prepared. FTIR spectroscopy of the nanocomposite films indicated that, by addition of CNSL, amide groups of the chitosan are probably less attached and have more space for vibration. CNSL seems to provide in
termolecular spaces between the chitosan molecules. Atomic force microscopy (AFM) analysis showed that the composite contained
particles measuring 100 nm or less, which confirmed that the nanocomposite had been successfully produced by this method. Addition of CNSL as plasticizer improved the tensile strength by 10% and the elastic modulus by almost 18%. Cell growth was observed on all the nanocomposite samples studied.