

DEVELOPMENT OF SILVER AND CLAY-STARCH BIO-NANOCOMPOSITES

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Starch, among biopolymers is that had the lowest production cost, wide availability, fully biodegradability and is a renewable agriculture resource. Starch due to its sensitivity to humidity and poor mechanical properties cannot be used in many applications. For that, the dispersion of clays in this material improves their physical and mechanical properties, at very low filler loadings. On the other hand, the incorporation of silver nanoparticles into biocompatible and biodegradable matrices gives antimicrobial properties opening a new field for packaging applications.

The aim of this work was to improved simultaneously mechanical properties and creating antimicrobial properties on starch biopolymer. The Cloisite® 30B a montmorillonite (MMT) was dispersed in starch solution by ultrasonic technique. The incorporation of silver nanoparticles (Ag-NPs) was synthesized directly in clay/starch solution via chemical reduction method. X-Ray diffraction analyses allowed to observe the clay exfoliation and dynamic mechanical analyses (DMA) confirmed the improvement of mechanical properties of the bionanocomposites. Regarding SEM results, a homogeneous dispersion of the silver nanoparticles was obtained. Antimicrobial activity in different microorganisms has shown that the bionanocomposite material can prevent the viability and growth of the common pathogens.