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CARACTERIZATION OF HPMC FILMS REINFORCED WITH CHITIN NANOMATERIALS AS PROMISING COMPOSITES FOR ECO-FRENDLY APPLICATIONS

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Nanocrystals (NCchit) and nanofibers (NFchit) extracted from chitin are considered as nanomaterials of great innovative potential and promising biomaterial for academic and industrial fields. The research related to their production and application is still new. In the other hand, in recent years, many research programs have focused on developing more and more bio-degradable packaging of natural polymers. Among them, those based on polysaccharide polymers such as hydroxypropylmethylcellulose (HPMC). This study is the first to investigate the compatibility and reinforcement effect of nano-size chitin fillers (NCchit and NFchit) on

Hydroxypropyl methyl cellulose (HPMC). NCchit aqueous dispersions were prepared by acid hydrolysis of commercial shrimp shell α -chitin while NFchit were prepared by mechanical defibrillation using closed loop grinding. The average widths and lengths of NFchit were (8.7 ± 3.17) nm and (673.9 ± 263.3) nm respectively while for NCchit were (9.7 ± 3.2) nm and (243.5 ± 55.1) nm. Composites of HPMC with different loadings of NCchit or NFchit were prepared by casting technique, using water as solvent. The effect of morphology and size of each nanomaterial on morphology, transparency, mechanical, thermal and barrier properties of the resulting nanocomposites were investigated using various techniques. The obtained results revealed the positive effect of both nanomaterials on HPMC by enhancing its mechanical properties. The nanocomposite films exhibited better oxygen and water barrier with slight decrease in transparency than control HPMC film. Overall, chitin NCchit offer superior reinforcing performance than chitin NFchit.

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