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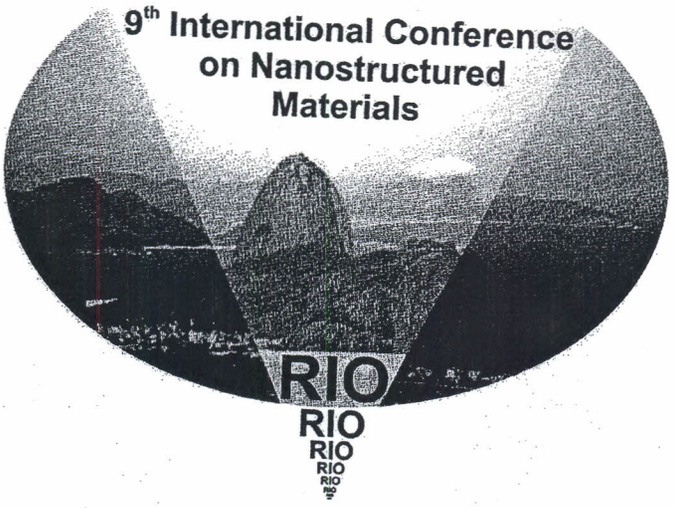

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ABSTRACTS

Influence of particle size on the thermal and water vapor barrier properties of HPMC films containing chitosan nanoparticles

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Cellulose derivatives such as hydroxyl propyl methylcellulose (HPMC) are promising materials for edible coatings or films. However, cellulose films are poor water vapor barriers (WVP) because of the inherent hydrophilic nature of polysaccharides [1]. Chitosan (CS) is of particular interest in the packaging field since it is biodegradable, bioabsorbable, and antimicrobial agent [2]. The aim of the present work is to study the effect of addition of nanoparticles made using CS on the thermal and water vapor permeability properties of HPMC films. Different sizes of nanoparticles were investigated in order to optimize the performance of the composites obtained. CS nanoparticles were produced by polymerization of methacrylic acid (MAA) in CS solution. A 3% HPMC solution was used with different sizes of CS-PMAA. The WVP of the control HPMC film was 0.79 g mm/ kPa h m^2. The WVP decreased significantly when nanoparticles were incorporated to HPMC films due to decreases in diffusion and solubility of water. For example, WVP decreased to 0.64; 0.59 and 0.47 g mm/ kPa h m^2 for films containing 59, 82 and 110 nm of CS-PMAA nanoparticles, respectively. HPMC films with only chitosan (no nanoparticle) have high solubility (100 %). It was found that film solubility significantly decreased with increasing particle sizes in the films. For example, the solubility decreased to 94.5; 96.4 and 97.3 % for films with 59, 82 and 110 nm of CS-PMAA nanoparticles, respectively. The Td (temperature of degradation) of films is also very important. In films that contain only HPMC, the Td is 289 °C. The addition of nanoparticles into the films increase the Td to 350; 362 and 369 °C for films with CS-PMAA of 110; 82 and 59 nm. These results suggest that CS-PMAA nanoparticles improve the properties of HPMC films.

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