

Abstract

Fabrication of CA/CS Composite Films by Solution Blow Spinning Method for Food Packaging Application [†]

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This study aims to develop new bio-based materials for food packaging using air spraying as a cost-effective manufacturing method. Materials prepared in the form of films were based on cellulose acetate (CA) modified with chitosan (CS), both purchased from Sigma Aldrich, St. Louis, MO, USA. The morphology, structure and performance in terms of thermal, mechanical, wettability and antibacterial behaviour were studied considering two variables: the solvent used to prepare solutions to be sprayed, acetic acid (HAc) or formic acid (FA) and the composition of the polymer system, 0%, 2.5%, 5% and 7.5% by CS weight. The resulting CA/CS composite films obtained exhibited remarkable flexibility and mechanical strength despite being derived from rigid, high-molecular-weight biopolymers. This flexibility is attributed to the unique droplet-based morphology of the films. Increased chitosan content led to enhanced surface roughness and higher water and oil contact angles, indicating improved hydrophobicity. Notably, films with 7.5% chitosan demonstrated antibacterial activity against *E. coli*, showing inhibited colony growth compared to pure CA films. Therefore, with this study it has been demonstrated that air spraying enables the fabrication of flexible, mechanically robust, and bioactive CA/CS films without the need for plasticizers. Their unique droplet-based morphology, high water contact angle, and antibacterial activity against *E. coli* highlight their suitability for sustainable food packaging. The use of biopolymers and an efficient processing method positions this approach as a promising alternative to conventional film-forming techniques.

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