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Enhancement of Egyptian soft white cheese shelf life using a novel chitosan/carboxymethyl cellulose/zinc oxide bionanocomposite film

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Highlights

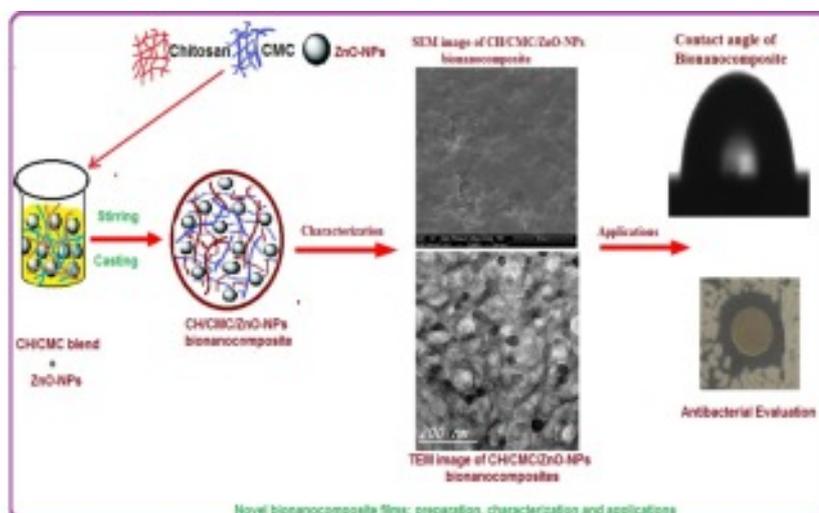
- ZnO-NPs prepared via green chemistry and added to CH/CMC blend by different ratios.
- Morphological, mechanical, antimicrobial properties of the bionanocomposite films were evaluated.
- Soft white cheese was manufactured and packaged using the bionanocomposite films.

â€¢ The obtained bionanocomposite extend the shelf life of cheese during storage period.

Abstract

A novel bionanocomposites packaging material prepared using chitosan (CH), carboxymethyl cellulose (CMC), and zinc oxide nanoparticles (ZnO-NPs), namely CH/CMC/ZnO bionanocomposites, was prepared by casting method. The CH/CMC/ZnO bionanocomposites were investigated using FT-IR, TEM, SEM, XRD, and TGA. The acquired bionanocomposites exhibited improved mechanical and thermal properties compare with the biocomposites (CH/CMC) blend. The soft white cheese were manufactured, packaged within the prepared bionanocomposites films and stored at 7Â° C for 30Â days. The influence of packaging material on packaged cheese (rheological properties, colour measurements, moisture, pH and titratable acidity) were assessed. Furthermore, the effect of packaging material on the total bacterial counts, mold & yeast and coliform in cheese was evaluated. The prepared bionanocomposites displayed good antibacterial activity against gram positive (*Staphylococcus aureus*), gram negative (*Pseudomonas aeruginosa*, *Escherichia coli*) bacteria and fungi (*Candidia albicans*). Moreover, the packaging films assisted in increasing the shelf life of white soft cheese. Therefore, it can be used in food packaging applications.

Graphical abstract





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Keywords

Chitosan; Bionanocomposite film; White cheese; Packaging materials; Zinc oxide nanoparticles; Shelf life

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