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Enhanced Antibacterial Activity, Mechanical and Physical Properties of Alginate/Hydroxyapatite Bionanocomposite Film

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Abstract:

The effect of hydroxyapatite nanoparticles (HA NPs) contents on the antibacterial activity, physical, and mechanical properties of sodium alginate (SA) film was scrutinized. The samples were prepared via incorporation of three different concentrations of HA NPs (1%, 3%, and 5%) into alginate solution at ambient temperature. In all SA/HA matrices, HA NPs demonstrated considerable bactericidal activity against foodborne pathogen during 12 days. The highest antibacterial effect of SA film was obtained in the presence of 5% HA NPs content and showed 3 CFU/mg reduction. In comparison to pristine alginate, different HA NPs additives enhanced elongation, tensile strength and moisture content of the nanocomposite films. Moreover, water solubility and water vapor permeability of the bionanocomposite were considerably reduced by 50% as the concentration of HA NPs content up to 5%.

Keywords: antibacterial activity, bionanocomposite film; sodium alginate, hydroxyapatite, synthesis, mechanical properties

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