2022-09-12

Bio-Based Food Packaging Material for Intelligent Food Packaging Applications for Chicken Fillets

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BIO-BASED FOOD PACKAGING MATERIAL FOR INTELLIGENT FOOD PACKAGING APPLICATIONS FOR CHICKEN FILLETS

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Bionanocomposite packaging is made up of bio- based materials that have high performance activity and are ecologically sustainable alternatives to packaging made of synthetic polymers. Intelligent packaging retains track of the state of the food and the environment in which it is stored, and communicates relevant changes to the consumer through visualization or other methods. The aim of this study was to develop a bionanocomposite intelligent packaging material by utilising sodium alginate, gelatin, nanoclay and curcumin. Sodium alginate, gelatin film incorporated with Curcumin (Cur), and Nanoclay (NC) in various concentrations (0% W/V, 0.5% W/V, 1% W/V and 1. 5% W/V) were prepared using the solvent casting method. The influences of nanoclay and curcumin on the optical, mechanical, physical, chemical, thermal, antibacterial and pH indicating properties were studied using a variety of techniques. All sample films were of high coloration and low transparency with a ΔE> 4. The thickness of all the film were around 0.08 mm and SA_Gel_Cur_1. 5%NC had the most effective UV barrier properties. The transparency of the films decreased and the UV barrier properties increased with the increasing NC concentrations. FTIR spectra of all samples were very similar, with no alterations to the control's functional groups. SA_Gel_Cur_1.5%NC had the most favourable combined mechanical properties with the highest tensile strength (4.15 ± 0.22MPa), and elongation at break of (6.14 ± 0.39%). All the films are hydrophilic in nature with < 90 contact angle. No films exhibited antibacterial properties against E. coli and S. aureus. Curcumin present at 0.3 W/V% was an effective pH changing indicator which changes from orange to red in alkaline conditions. When tested on chicken breast fillet the developed intelligent packaging film changed to red*

with the increasing storage time up to 15 days. The developed films had an effective UV barrier capability and pH indicating properties and therefore can be used as smart food packaging to improve the quality of and increase the shelf life of foods. Further, recommendations suggest introducing essential oils or other antimicrobial agents to the bionanocomposite to improve the antibacterial efficacy.

Keywords: *intelligent packaging, nanoclay, sodium alginate, gelatin, curcumin*