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Assessing and Characterizing Cellulose Acetate Films Enhanced with Natural Compounds for Active Packaging Applications

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Abstract : Biodegradable and renewable-based polymeric packaging like cellulose acetate (CA) is an alternative to petroleum-based polymers, in the way of low cost and also creates a positive outcome on both environmentally. The objective of the present research was to develop bioactive packaging films from cellulose acetate incorporated with a low-cost cypress essential oil (EO). We prepared cellulose acetate films via solvent casting method incorporating 0, 10, 30, and 60 % (w/w) of EO, with the purpose of evaluating the possible changes caused by the cypress essential oil on the properties of the packaging. The films were characterized using FTIR, TGA, XRD and other analysis technologies. The mechanical, antibacterial and antioxidant properties of the films were analyzed. FTIR and XRD analysis indicated that cypress EO was homogenously distributed on the film. Meanwhile, TGA analysis demonstrated that the addition of EO had an impact on thermal properties. The impact of EO on mechanical and optical properties was explored. The results displayed that antibacterial activity against Escherichia coli and Staphylococcus aureus increased as cypress essential oil percentage increased in cellulose acetate films. Moreover, free radical scavenger activity by DPPH of cellulose acetate films improved by increasing the cypress essential oil concentration. These results indicate that the films of cellulose acetate containing cypress essential oil have potential for use as active packaging for foods.

Keywords : cellulose acetate, essential oil, active packaging, antibacterial, antioxidant
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