Short Communication

Electrochemical Synthesis of ZnO Nanoparticles and preparation of Pea Starch/ZnO composite for Active Food Packaging Application

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ZnO nanoparticles were synthesized using a facile electrochemical technique in large-scale production. Nanocomposite films designed based on pea starch (PS) incorporated with ZnO nanoparticles were successfully prepared and characterized. Biopolymer films with high UV absorption and enhanced resistance to sunlight were obtained by samples incorporated with ZnO nanoparticles in concentrations between 1 and 5 wt%. 5% ZnO content incorporated nanocomposite matrix was the least permeable to water vapor. The interplay between the ZnO and the polymer matrix structure may have contributed to the significant decrease in water solubility of the PS/ZnO nanocomposite. The PS/ZnO (5 wt%) nanocomposite film has the best antimicrobial activity among the films tested. Cyclic voltammetry analysis of the samples indicated higher conductivity of the PS/ZnO nanocomposite which can result in the enhancement of the antibacterial properties of starch-based polymer through the electrostatic discharge between ZnO nanoparticles and bacteria. Biopolymer film incorporated with ZnO nanoparticles exhibited excellent antibacterial activity and has the potential to be used to properly preserve the packaged foods by employing it as an active food packaging material.

Keywords: ZnO nanoparticles powder; Electrochemical technique; PS/ZnO biopolymer films; Antibacterial activity

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