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Abstract

Photocatalytic and Antibacterial Behavior of Composite Nanofilms, Containing Polylactide (PLA), Polyvinylpyrrolidone (PVP) and Hydrozincite †

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Abstract: Composite nanofilms based on biopolymers (PLA, PVA etc.) and ZnO are alternative materials for "green" food packaging. The combination of the useful features of the both biopolymer (compostability and biodegradability) and good barrier, antioxidant and antibacterial properties of Zn-containing materials (hydrozincite, HZ) make these materials attractive for different applications [1]. The biocomposite films of PLA and PLA/PVP containing 5wt% hydrozincite powders have been obtained by sol-gel method. The Mentha Arvensis – mediated hydrothermal synthesis was applied to obtain the HZ powders [2]. The photocatalytic activity and antibacterial efficacy against Escherichia coli (food pathogen) of the synthesized nanofilms were investigated. The X-ray diffraction analysis and Fourier-transform infrared spectroscopy were used to determine the phase composition and functional groups. The comparative photocatalytic investigations about degradation of two model dyes – Malachite Green (MG) and Reactive Black 5 (RB5) in aqueous solution (5 ppm) under UV light were performed. The PLA/Hydrozincite and PLA/Hydrozincite/PVP photocatalysts have higher discoloration degree towards MG dye after 150 minutes UV irradiation (31 and 87 % resp.) than those towards RB5 dye (about 25%). The both nanofilms exhibit high antibacterial effects. The bacterial concentration decreased by about 99% and 97% for PLA/Hydrozincite/PVP and PLA/Hydrozincite nanofilms, respectively after 1 hour of contact. The obtained composites could be used as an alternative of standart food package materials.

References

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