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Use of Poly(3-hydroxybutyrate) as Polymer Base for Drug Delivery Systems

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One of the most discussed applications of polyhydroxyalkanoates (PHA) is their use in medicine as scaffolds, drug carrier systems, and wound dressings, made by solution casting, electrospinning, or thermoplastic extrusion. Often, the porosity was found as an essential attribute of specimens used for pharmaceutical and medical applications. the PHA porous materials offer unique properties such as biocompatibility, bioactivity, non-cytotoxicity, and biodegradability. This contribution is focused on the study of the release of active substances from porous structures based on poly(3-hydroxybutyrate) (PHB) films. PHB is a semicrystalline biopolyester with the ability to degrade in vivo and in vitro without toxic substances.

The porous scaffolds were formed from PHB by electrospinning. This work confirmed that the morphology of PHB scaffold is possible to varied by the PHB concentration and solvents used for electrospinning. Scanning electron microscopy revealed the formation of different morphologies, including porous, filamentous/beaded, and fibre structure films. As the model drug for incorporation into PHB meshes was used Levofloxacin, which possess with a high antibacterial efficiency against gram-positive and gram-negative bacteria. Its entrapment efficiency was found to be dependent on the viscosity of the PHB solution used for electrospinning, its incorporation in meshes was confirmed by Fourier-transform infrared spectroscopy and UV-VIS spectroscopy. the effect of the morphology of the films on the Levofloxacin release profile was screened in vitro in phosphate-buffered saline solution. the antimicrobial efficiency of all tested samples was confirmed by agar diffusion testing.

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Keywords: *polyhydroxyalkanoates, scaffolds, electrospinning, antimicrobial activity, morphology*

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