

Название публикации:

Characterization and Evaluation of Controlled Antimicrobial Release from Petrochemical (PU) and Biodegradable (PHB) Packaging

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Аннотация:

The academic exploration and technology design of active packaging are coherently supplying innovative approaches for enhancing the quality and safety of food, as well as prolonging their shelf-life. With the object of comparison between two barrier materials, such as stable petrochemical polyurethane (PU), (BASF), and biodegradable natural poly(3-hydroxybutyrate) (PHB), (Biomer Co., Krailling, Germany), the study of antibacterial agent release has been performed. For the characterization of polymer surface morphology and crystallinity, the scanning electron microscopy (SEM), atomic force microscopy (AFM) and differential scanning calorimetry (DSC) were used respectively. The antimicrobial activity of chlorhexidine digluconate (CHD) has been estimated by the Bauer-Kirby Disk Diffusion Test. It was shown that the kinetic release profiles of CHD, as the active agent, in both polymers, significantly differed due to the superposition of diffusion and surface degradation in poly(3-hydroxybutyrate) (PHB). To emphasize the special transport phenomena in polymer packaging, the diffusivity modeling was performed and the CHD diffusion coefficients for the plane films of PU and PHB were further compared. The benefit of active biodegradable packaging on the base of PHB is discussed.

Ключевые слова:

active packaging; antimicrobial agent; diffusion; controlled release; petrochemical polyurethane; microbial poly(3-hydroxybutyrate); biodegradable packaging