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ОСОБЕННОСТИ БИОДЕГРАДАЦИИ БИНАРНЫХ КОМПОЗИТОВ ПОЛИЛАКТИДИД/ПОЛИБУТИЛЕНАДИПИНАТТЕРЕФТАЛАТ (ПЛА/ПБАТ)

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Смеси полилактида (ПЛА) и полибутиленадипинаттерефталата (ПБАТ) считают перспективными биоразлагаемыми полимерными композитами. Эти полимеры обладают разными физико-механическими свойствами, в связи с чем представляет интерес изучение их смесей. Цель работы — изучить структуру и теплофизические, механические свойства бинарных композитов ПЛА/ПБАТ; оценить возможность их самопроизвольной деградации в почве в условиях климата умеренных широт.

В ходе работы методом прессования изготовили однокомпонентные пленки из каждого полимера и бинарные на основе ПЛА и ПБАТ при соотношении, в мас.%, 90/10, 80/20, 70/30, 60/40, 50/50, 40/60, 30/70, 20/80, 10/90. Смешение компонентов осуществляли в расплаве. Провели исследования физико-механических и теплофизических свойств исходных образцов, а также их микроскопический анализ, позволяющий судить о структуре бинарных композитов. Влияние выдержки в грунте оценивали по изменению теплофизических свойств и по потере массы

Образцы пленок бинарных композитов ПЛА/ПБАТ и однокомпонентные пленки подвергали натурным испытаниям в стандартизированном грунте в течение 6 месяцев. Температура плавления и степень кристалличности образцов после испытаний практически не меняются. После нахождения в грунте отмечена потеря массы образцами пленок от 2% до 6%, ее значение зависит от количества ПБАТ в составе. По потере массы и визуальным изменениям можно сделать вывод о начальном этапе биодеструкции.

Ключевые слова: полилактид, полибутиленадипинаттерефталат, биополимеры, структура бинарных смесей, кристаллизация, потеря массы, степень кристалличности, температура стеклования, относительное удлинение при разрыве, температура плавления.

THE BIODEGRADATION FEATURES OF BINARY COMPOSITES OF POLYLACTIDIDE/POLYBUTYLENE ADIPATE TEREPHTHALATE (PLA/PBAT)

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Since polylactide (PLA) and polybutylene adipate terephthalate (PBAT) have different physical and mechanical properties, it is of interest to study their composites. The purpose of this work is to establish the structure of binary PLA/PBAT composites, their thermal and mechanical properties and to

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assess the impact of soil on them. The effect of exposure in the ground was assessed by changes in thermal properties and by weight loss.

Binary films based on PLA and PBAT were made with the ratio of components 90/10, 80/20, 70/30, 60/40, 50/50, 40/60, 30/70, 20/80, 10/90 using hot pressing approach. Mixing of the components was carried out in the melt. The mechanical and thermophysical properties of the initial single-component and binary samples were studied. Microscopic analysis was carried out to explore the structure of binary composites.

Samples of PLA/PBAT binary films and single-component films were subjected to full-scale tests in standardized soil for 6 months. The melting point and the degree of crystallinity of the samples after testing almost do not change. After being in the ground, a mass loss of film samples from 2 to 6% was noted. Its value depends on the amount of polybutylene adipate terephthalate in composite. Based on weight loss and visual changes, we can conclude that the initial stage of biodestruction is in progress.

Keywords: polylactide, polybutylene adipate terephthalate, biopolymers, binary blend structure, crystallization, weight loss, degree of crystallinity, glass transition temperature, relative elongation, melting point.

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