

Название публикации:

Influence of Filler Particle Size on Physical Properties and Biodegradation of Biocomposites Based on Low-Density Polyethylene and Lignocellulosic Fillers

Авторы:

Zykova, AK [1,2] ; Pantyukhov, PV [1,2] ; Kolesnikova, NN [2] ; Monakhova, TV [2] ; Popov, AA [1,2]

[1] Plekhanov Russian Univ Econ, Stremyanny Per 36, Moscow 117997, Russia

[2] Russian Acad Sci, Emanuel Inst Biochem Phys, Kosygina St 4, Moscow 119334, Russia

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Аннотация:

This study examined biocomposites based on low-density polyethylene (LDPE) and lignocellulosic fillers [wood flour (WF) and oil flax straw (FS)] selecting four size fractions of each lignocellulosic material as fillers for the composites. The primary aim was to evaluate the influence of fraction size on the composites' basic properties; to accomplish this, the composites' mechanical properties, thermal oxidation, thermophysical characteristics, and water absorption capacity were examined. Then microphotographs of the samples were created and length-to-diameter (L/D) ratio of the fillers was calculated, finding that the L/D ratio increased with increasing particle size. The particle size influenced the oxidative degradation and water absorption processes in composites with oil flax but not in those with WF. Biodegradation tests performed on the recovered soil found that the loss of mass in composites based on LDPE and FS was higher than in the same composites with WF. Moreover, at the initial stage of composting, the biodegradation rate correlated with the size of filler particles (i.e., the larger the particles, the higher the degradation rate of the biocomposite).

Ключевые слова:

Wood-plastic composites; mechanical-properties; coupling agent; polypropylene composites; polymer composites; thermal-properties; water-absorption; flour composites; fiber; degradation