PS3

ENHANCED MICROBIOLOGICAL DEGRADATION OF POLYETHYLENE

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Micrological degradation of plastic waste is one of the most promising directions for finding sustainable solutions to the global problem of environmental pollution by plastics. Low-density polyethylene (LDPE) is one of the prevalent recalcitrant plastic pollutants. Under standard conditions LDPE biodegradation rate can be as low as 0.5% in 10 years. So, elaboration of efficient biodegradation techniques depends, among other things, on identification of means that can substantially stimulate the biodegradation process. Irradiation by ultraviolet light, exposure to various nanoparticles, and to enzymes participating in lignin decomposition were suggested among such means. The purpose of our work was to test whether microbiological degradation of LDPE in mineral media can be enhanced by LDPE pretreatment by UV light and by nanocomposites consisting of magnesium ferrite and stabilized by polyvinylpyrrolidone ($MgFe_2O_4$/PVP), and by introduction of lignin into the medium. According to the obtained results, introduction of LDPE films pretreated by UV light and by $MgFe_2O_4$/PVP into mineral medium with added lignin caused a substantial increase in CO_2 efflux during 100 days of incubation under standard conditions. This efflux was 1.3 and 2.2 times greater than the one in the controls with untreated LDPE and without LDPE, respectively. By the end of the incubation the weight loss in the control with untreated LDPE was negligible, while in the variant with pretreatment it reached 18%.

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