High density polyethylene and polylactide biodegradation by microorganisms– Preliminary studies

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This study present results of microbial activity towards polylactide (PLA) and high density polyethylene (HDPE) degradation. Three selected from environment microorganisms species were used in project i.e. *Achromobacter xylosoxidans* PE-1 for HDPE and two species of mold, i.e. *Aspergillus niger* and *Penicillium minioluteum* for PLA. Three types of the PLA were tested: two with starch modification (20% - PLA20 and 50% - PLA50) and one unmodified PLA. The samples of plastic film were incubated in liquid mineral medium inoculated with isolated strains. The chemical structure changes of the samples were analyzed by Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR-FTIR). Structure and the surface of the plastic films was monitored by Scanning Electron Microscope (SEM). Additionally, weight loss of samples was controlled. The greatest weight loss (about 20%) was observed for the PLA and it was two times higher than for the PLA20. About 9% loss of weight was also detected as a result of *A. xylosoxidans* PE-1effect on HDPE film. FTIR analysis showed visible changes of spectra of PLA and HDPE samples treated with microorganisms, as the signal intensity indicated the reorganization of bonds and new bonds in tested range of the spectra were observed. The SEM photographs of bacteria and mold strains treated samples also demonstrated changes of the film structure which was visibly rough in comparison to smooth surface of the control samples, and the higher was the content of starch in the case of PLA, the more damaged was the film sample.

Biography

Anna Kowalczyk has graduated from AGH University of Science and Technology in Environmental Protection, 2012 and from Jagiellonian University in Biology, 2013. Now she is doing research for her PhD thesis on the plant-microbe interactions under heavy metals stress in terms of application for phytoremediation. Since 2016 works as a lab manager in Department of Plant Physiology and Biochemistry on Faculty of Biochemistry, Biophysiscs and Biotechnology on Jagiellonian University, Cracow Poland. She also participates in projects continuing her previous research on plastic biodegradation.

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