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Effect of biodegradation on physical properties of PLA-based blends

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Biodegradable plastics undergo substantial changes due to degradation by enzymes produced by various bacteria. From application point of view, modification of physical properties is important, occurring even when the testing specimens are apparently unchanged. Degradation in compost of Polylactic Acid (PLA), PLA with a plasticizer Triacetin (TAC) and a mixture of PLA/Polyhydroxybutyrate (PHB)/TAC proceeded at temperature 58 °C up to 16 days. Then, the biodegradation degree was determined by measuring the content of evolved carbon. The degradation rate was found to vary a little for the three samples. While the biodegradation tests were performed to almost complete biodegradation of the materials to carbon dioxide and water. Physical properties could be measured only for the first eight days and in some cases up to 16 days when it is possible to separate the material from the compost. At longer periods the materials have been disintegrated to small fragments and separation of the sample from compost was impossible. Numbers of testing methods were applied. Molecular weight and molecular weight distribution was determined by GPC, supported by measuring the viscosity by rheology. Structures of the materials were estimated from changes in Tg and crystallinity. Mechanical properties of samples and the data were compared with information obtained from dynamic mechanical analysis. The conclusions have been made regarding the effect of TAC and PHB presence on the biodegradation of PLA and related changes concerning the structure/mechanical relations.

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Biography

Ivan Chodak he is currently Full Professor of Macromolecular Science, Slovak Technical University Education. His research focus on Multiphase systems with a modified polymeric matrix, synthesis and properties. Crosslinking of polymers, especially polyolefins and rubbers. Nano composites with polymeric matrices, special experience with matrices of biodegradable plastics and rubbers. Modification of biodegradable plastics, physical, chemical, blending. Electro conductive polymeric composites. A member of Editorial Board of *Plasty a kaučuk* (Plastics and Rubber), Czech republic, member of Editorial board of *Bentham Open Macromolecular Journal*. More than 130 papers in peer reviewed international scientific journals (mainly CC), 8 chapters in monographies, about 100 lectures in scientific conferences (including about 30 invited key and plenary lectures), 12 slovak patents, 3 European patents. Around 900 citations, Hirsch index 14.

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