24.09.2020

Processing and applications of polyhydroxyalkanoates

Adriana Kovalcik

Department of Food Chemistry and Biotechnology, Faculty of Chemistry, Brno University of Technology, Brno, Czech Republic

The biodegradable properties of polyhydroxyalkanoates (PHA) have been identified as a promising solution to decrease packaging waste from cities, environment and landfill. Moreover, PHAs are biocompatible and meet several criteria as biomaterials for the utilisation in pharmaceutical, cosmetic and medical applications. They also may contribute to the circular economy if their biosynthesis is planned, including the use of local food and agricultural intermediates and wastes. However, PHAs may not necessarily provide all required physical properties for polymer processing and thermo-mechanical behaviour of final products. Taking a different chemical nature and wide range of physical properties approach, this paper addresses the issue for the diversity of PHAs, their thermal, viscoelastic and mechanical properties. Depending on the chemical structure and physical properties, various polymer processing methods will be suggested and discussed, such as solution casting and melt processing. This work provides an insight into PHA´s hydrolytic degradation, biodegradation in model fluids and compost. The resulting picture suggests that PHAs display environmental benefits if they are synthesised within the circulation economy schema. This work was funded through the internal Brno University of Technology project FCH-S-20-3613 and by the Ministry of Education, Youth and Sport of Czech Republic (project 7AMB19AT).

Keywords: Biodegradation, Films, Fused deposition modelling, Mechanical properties, Polyhydroxyalkanoates, Thermal properties