

Production of Biodegradable Polymers from Food Waste

¹Alexis Theodorou, ¹Maria Chrissie Isabella Baltzaki, ²Ioannis N. Daliakopoulos, ³Christos Tsompanidis, ²Thrassyvoulos Manios, ²Katerina Katrini, ²Angeliki Maragkaki and ¹Kelly Velonia

¹*University of Crete, Department of Materials Science and Technology, Heraklion, Greece*

²*Department of Agriculture, Hellenic Mediterranean University, Heraklion, Greece*

³*ENVIROPLAN SA, Gerakas 153 44, Greece*

Abstract

Around 15 million tons of disposal plastic trash and 88 million tons of food ends up as solid wastes every year in Europe. Renewable and biodegradable polymers have been considered as one long-term solution for the environmental damaging impact of petropolymers and plastic pollution. Aiming to contribute to the reduction of food and plastic waste, we designed a pilot bio-refinery for the production of compostable bioplastic as a total material recycling process for municipal food waste following the system proposed by Sakai et al. (2003) This contribution focuses on the optimization of the polymerization step for the synthesis of poly-lactic acid (PLA) from the waste produced lactic acid. PLA was synthesized via a tin (II) 2-ethylhexanoate catalyzed direct polycondensation of lactic acid or via ring opening polymerization of the cyclic intermediate lactide. Both resulted in the production of low or medium molecular weight PLA and optimized to afford the targeted molecular weights. Main goal of the laboratory studies was to develop an efficient experimental process based on lactic acid produced from food waste collected in the municipality of Heraklion to achieve PLA synthesis in high yields.

Keywords: biodegradable polymers, bioplastic, PLA

References

Sakai, K., Taniguchi, M., Miura, S., Ohara, H., Matsumoto, T. , Shirai, Y., 2003. Making Plastics from Garbage - A Novel Process for Poly-L-Lactate Production from Municipal Food Waste. *Journal of Industrial Ecology* 7(3-4), 63.

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