RETASTE Conference Abstracts
RETASTE-NOV-1510-In-person Poster
Rethymno, September 16-18, 2026
© Author(s) 2026 CC BY 4.0 License
DOI:10.5281/zenodo.23678223

Effect of Mechanical Recycling of PLA Water Bottles on Their Technological Properties and Compostability

Carol López de Dicastillo

IATA, Spain

ACCEPTED

Abstract

Environmental concerns arisen from the great plastic contamination linked to the substantial increase in the use of plastics have promoted a strong interest in biodegradable plastics. Specifically, poly(lactic acid), PLA, has become one of the most widely used biopolymer thanks to its technological properties and its compostable nature. PLA is commercially available and can be processed by conventional melting extrusion, being part of current food packaging systems in the market, such as bottles, trays and flexible bags. The interest in the incorporation of biopolymers into the market by the food industry has increased, and in fact, the Spanish Company Cabreiroá has recently launched water bottles made from PLA. Despite its compostability, a sustainable development prioritizes the materials are circularly re-integrated into the economic process and therefore, the resource use can be maximized and the waste is reduced, both goals towards circular economy. In this work, in order to study the feasibility of recycling these bottles and reincorporating them into the processing chain, the degradation of the polymer chains after recycling of the material was analyzed. Thus, the objective of this work was to study the impact of its reprocessing in up to six consecutive cycles and the simulation of a mechanical recycling process, including photochemical, thermal, hydrothermal and washing processes, on the structural and physical properties of PLA, such as the molecular weight, barrier, thermal and optical properties. In brief, the research has evidenced a clear reduction of the molecular weight of recycled and reprocessed polymer, accompanied by changes in color, crystallinity, and therefore, thermal and permeability values. Understanding the biodegradation behavior of recycled biodegradable plastics is crucial to ensure that recycling-induced changes, particularly the increase in crystallinity, do not compromise their end-of-life performance by affecting the rate and extent of biodegradation.

Keywords: poly(lactic acid), recycling, composting

Acknowledgments: The authors acknowledge the award of the Spanish government MCIU/AEI to the IATA-CSIC as Center of Excellence Accreditation Severo Ochoa (CEX2021- 001189- S/MCIU/AEI /10.13039/501100011033) .