Degradable Bioplastic Packaging for Sustainable Food Systems

The technology has the potential to reduce plastic packaging waste sent to landfill, while contributing to sustainable energy or compost production.

Keywords: poly(lactic acid), polymer blends, anaerobic degradation, packaging

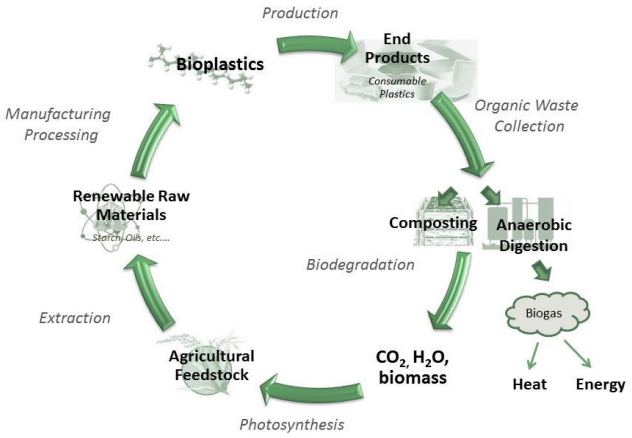
Process Implementation Readiness

Basic Research | **Proof of Concept** | **Early-stage Tech Dev** | **Product Dev** | **Production**

Background and Technology Description

The focus of this research program was to improve key properties of bio-degradable plastic blends and expand the range of applications in packaging markets. The ultimate objective is to develop bioplastic packaging materials that are suitable for aerobic and/or anaerobic degradation when combined with food scraps, while still meeting performance/cost requirements and reducing waste to landfill.

Closed Loop of Renewable, Degradable Plastics



Research Overview

Researchers at the Rochester Institute of Technology's Dept. of Packaging Science and Golisano Institute for Sustainability used a systematic approach to develop formulations and study the effect of certain additives in these formulations.

Effects of co-digestion with food waste at mesophilic (37°C) and thermophilic (52°C) conditions were evaluated. Tensile properties and viscosity were measured to characterize both mechanical performance and processability. Aerobic degradation was characterized in selected formulations.

Outcomes

Custom synthesized poly(L-lactic acid)-co-poly(glycolic acid) PLGA copolymers proved to improve the degradation rate when blended with commercial PLA without affecting mechanical properties. Adding 20% copolymer reduced degradation time from 60 to 40 days under thermophilic conditions.

Calcium carbonate at low concentrations showed potential to improve biodegradation rates by providing a pathway for microbial activity. Co-digestion of PLA with food-waste resulted in a 10% increase in biomethane potential, indicating a synergistic effect. It was demonstrated that degradation rates are strongly correlated with starch content. Pilot-scale thermoformed containers were manufactured successfully with up to 60 wt.% starch.

Target Customers

Plastic suppliers (e.g., Ingevity), converters (Pactiv), retailers (Wegmans), and zero waste initiatives (Impact Earth) can benefit from these innovative formulations to create biodegradable products that can readily degrade in anaerobic digesters and composting facilities.

Intellectual Property

This technology is currently not under patent.

Opportunity

NYSP2I and RIT are interested in working with qualified parties for continued technology and product development.

NYSP2I | New York State Pollution Prevention Institute

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Partners

RIT | Binghamton University State University of New York | Clarkson University | Cornell CALS College of Agriculture and Life Sciences | Rensselaer

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