Docket #: S25-497

A Degradable Semicrystalline Bio-derived Polyester with Exceptional Thermal Properties

Stanford researchers have developed PODO, a degradable, bio-based polyester that could serve as a more sustainable alternative to conventional single-use plastics. Single-use plastics often persist in the environment for decades or centuries, while many existing bio-based alternatives, such as PLA and PHA, can be brittle, difficult to process, or limited by low heat tolerance. PODO addresses these challenges by combining degradability with high melting temperatures and tunable processing properties. From one monomer, researchers can produce two plastic-like materials with different thermal profiles: one with a melting temperature around 200°C and fast crystallization behavior for applications such as fibers, bottles, and heat-tolerant packaging, and another with a melting temperature around 130°C and slower crystallization behavior for molding applications. This technology could help companies develop degradable plastic products that better meet the performance and processing needs of packaging, textiles, agricultural films, and other short-lived plastic markets.

Proof of Concept: Ongoing work focuses on developing higher-molecular-weight versions for more realistic performance testing.

Applications

- Degradable single-use packaging
- Food packaging and containers
- Plastic bottles
- Textile fibers and nonwoven products
- Waste packaging
- Single-use medical implements

Advantages

- Bio-derived alternative to conventional petroleum-based plastics
- Designed for degradability to reduce long-term plastic waste
- Higher melting temperature than several commercial bio-based polyesters
- Faster crystallization kinetics than common bioplastics such as PLA and PBAT
- Tunable thermal properties from a single monomer

Innovators

- David Dumas
- Kai Hin Lui
- Matthew Kanan
- Robert Waymouth
- Hongyi Zhang
- Lucas Sanchez

Licensing Contact

Michael Spaid

Technology Licensing Associate 2

Email