TECH OFFER

Plant-based Additive for Bioplastic Barrier Enhancement

KEY INFORMATION

TECHNOLOGY CATEGORY:
Chemicals - Additives
Sustainability - Circular Economy
Waste Management & Recycling - Food & Agriculture Waste Management

TECHNOLOGY READINESS LEVEL (TRL): TRL4
COUNTRY: SINGAPORE
ID NUMBER: TO175418

OVERVIEW

Bioplastics have emerged as a sustainable alternative to conventional petroleum-based plastics, offering biodegradability and reduced carbon footprint. However, their use in high-performance applications remains limited because of inherent material weaknesses. A key challenge is their poor barrier properties, particularly against water vapour and gases such as oxygen and carbon dioxide. This limitation prevents bioplastics from being widely adopted in packaging applications that demand strong protective qualities, such as food products, pharmaceuticals, and sensitive electronic components. In most cases, bioplastics are restricted to low-demand items like disposable bags or cutlery, where barrier performance is not critical.

This technology addresses the key challenge of poor barrier properties by introducing a plant-waste-derived additive that enhances barrier properties of bioplastics. Incorporated directly during melt processing, the additive reduces the water vapour transmission rate (WVTR), enabling bioplastics to provide effective moisture protection. Because the additive is derived from

upcycling of plant waste, it reinforces the sustainability narrative while aligning with circular economy principles. This technology also functions as a drop-in solution compatible with existing manufacturing processes, allowing packaging producers to adopt the technology without costly modifications.

The technology owner is interested in co-development R&D opportunities and out-licensing of the developed IP with companies developing sustainable bioplastic products with enhanced barrier properties.

TECHNOLOGY FEATURES & SPECIFICATIONS

This technology is an eco-friendly additive that enhances barrier performance in bioplastics.

Key features of this additive include:

- Made from recycled plant waste
- Improves bioplastics' ability to block water vapour without compromising on mechanical strength (tested according to ASTM F 1249-20)
- Drop-in solution – no changes required to current bioplastic manufacturing process

The additive has been successfully tested with PBAT to decrease its WVTR.

POTENTIAL APPLICATIONS

- Food packaging: Sustainable packaging with effective moisture barrier properties is ideal for products like bakery items, cereals, snacks etc, catering to diverse shelf-life requirements.
- Medical and pharmaceutical packaging: Bioplastics with enhanced barrier properties can be used for packaging sensitive medical devices and pharmaceuticals that require protection from moisture or oxygen.
- Personal care and cosmetics: Sustainable packaging solutions cater to moisture-sensitive personal care products like lotions, creams, or shampoos.
- Agricultural: Biodegradable mulch films with improved water vapor control for agriculture.

UNIQUE VALUE PROPOSITION

- Offers a sustainable bioplastic additive as it is derived from plant waste
- Improves barrier protective properties of bioplastic by 25%
- Seamless integration with existing bioplastic manufacturing processes