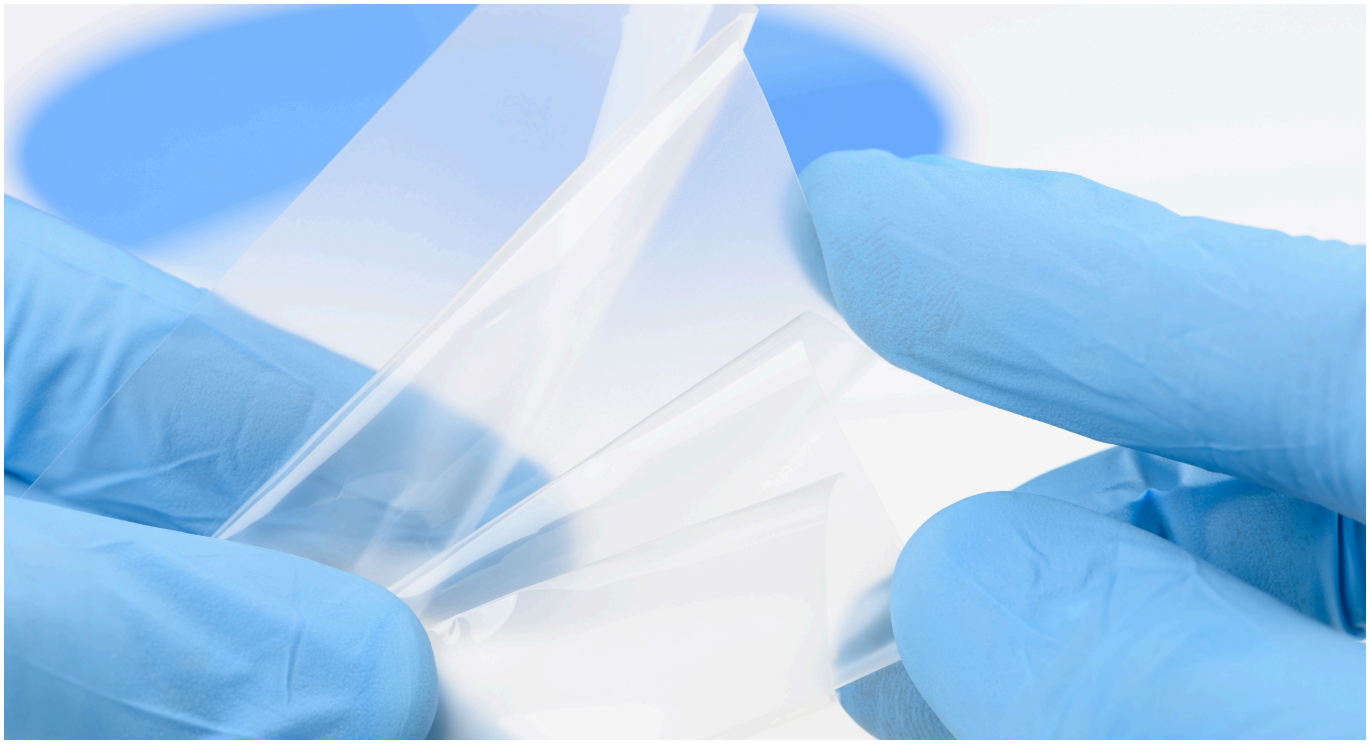
TECH OFFER

Upcycling Hair And Feathers Into Biodegradable Bioplastics



KEY INFORMATION

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

TECHNOLOGY READINESS LEVEL (TRL): TRL4
COUNTRY: SINGAPORE
ID NUMBER: TO174814

OVERVIEW

Keratins are naturally occurring proteins found in hair, feathers, wool and other external protective tissues of animals. They are highly abundant, naturally produced and generally underutilized. At the same time, keratins offer versatile chemical properties that allow interactions with themselves or with other materials to improve behaviour.

The technology provider has developed sustainable, biodegradable plastic materials by upcycling keratins derived from hair and feathers. In the preliminary studies, the technology provider has found ways to produce films that have the potential to be used as packaging materials. These films do not disintegrate readily in water, yet they fully degrade in soil within a week. They can be made in combination with other waste-derived biopolymers to improve strength to meet the needs of specific use cases.

This technology is available for R&D collaboration, IP licensing, or IP acquisition, with industrial partners who are looking for a green packaging solution and to explore specific-use-case products. The technology provider is also interested to collaborate

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with the OEM partners having the keratin extraction facility from feathers and hair for the deployment of this technology.

TECHNOLOGY FEATURES & SPECIFICATIONS

- Nature-derived material from waste streams (agricultural, livestock and human hair)
- Tunable strength, ~60% strength of PE film
- Stable in water over 3 weeks (hydrostability)
- Fully degraded in soil within 7 days at room temperature without the need for industrial facilities
- Protein based film. Possibility to incorporate bioactive functionalities into the film

POTENTIAL APPLICATIONS

- Biodegradable packaging material- these films do not disintegrate readily in water, yet they fully degrade in soil within a week
- Biodegradable composites- potential to be combined with existing biopolymers such as cellulose to make strong composites for food contacting packaging and utensils

UNIQUE VALUE PROPOSITION

- Sustainable upcycling of abundant waste streams
- Fully biodegradable in a short time within a natural environment
- Possibility to include bioactives

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