NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
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Biodegradable Plastics from Upcycled Biomass Wastes

TECHNOLOGY OVERVIEW

The development of eco-materials from biomass wastes has been fuelling the growth of the waste management market. Being 100% wholly natural and bio-based made from both plant and animal bioresources, these biodegradable plastics films eliminate the use of non-renewable, oil-based feedstock and has a lower carbon footprint.

The developed biodegradable films exhibited excellent hydrostability and can be complemented with engineered properties to match their conventional plastics equivalent. Product durability can also be customised through the film's tailorable biodegradability.

At the end of product service life, the waste derived eco-friendly film will alleviate its environmental burden through natural degration. Film disintegration occurs within days upon disposal, releasing carbon, sulfur and nitrogen from the keratin and enriching the soils for healthy plant growth.

Fragmentation of degradable film within 6 days (top)

FEATURES & SPECIFICATIONS

- Various properties can be profiled through conventional plastic technologies
- Good dimensional stability
- Fully degradable at controllable rate
- Closed-loop end of life option

MARKET TRENDS & OPPORTUNITIES

- The global biodegradable plastics was valued at US$ 7.9 billion in 2023. Driven by rising demand due to regulatory and voluntary social responsibility, a further growth of 21.3% CAGR to US$20.9 billion by 2028 can be expected.
- Product and brand owners has led to a significant increase in the type and quantity of feedstocks for bioplastics manufacture. In response to such a market pull, biomass waste stream, which mounted a global annual generation in the order of 140 Gt, has started to become an attractive precursor for bioplastics.

POTENTIAL APPLICATIONS

- Packaging
- Food Service Wares
- Agriculture
- Horticulture