

TECH OFFER

Transforming Agricultural By-Products into Sustainable Materials



KEY INFORMATION

TECHNOLOGY CATEGORY:

Sustainability - Circular Economy

Materials - Composites

TECHNOLOGY READINESS LEVEL (TRL): **TRL5**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO175416**

OVERVIEW

The global push for sustainability is driving demand for innovative solutions to reduce waste and conserve resources. While the focus has often been on synthetic materials like plastics, millions of tons of agricultural waste remain underutilized. Instead of being landfilled or incinerated, this renewable feedstock offers a major opportunity to support a circular economy and lessen dependence on virgin resources, especially as industries seek new ways to upcycle agricultural by-products into higher-value materials. These advancements also align with broader efforts to strengthen sustainable agriculture in Singapore as the nation seeks eco-friendly material innovations.

This technology is a proprietary, chemical-free process that converts agricultural by-products into durable, eco-friendly materials. By harnessing diverse agricultural waste streams, this process yields thin plates and modular elements that can replace conventional raw materials in applications such as roofing, flooring, furniture surfaces, and wall furnishings. Designed for circularity, these materials can be broken down and reintroduced as feedstock at the end of their lifecycle, minimising waste and maximising resource efficiency in ways that further support sustainable agriculture in Singapore.

The technology owner is actively seeking R&D co-development and out-licensing of the developed IP to companies interested in advancing sustainable materials and scaling this circular economy solution.

TECHNOLOGY FEATURES & SPECIFICATIONS

The technology offers an innovative approach to material science, converting diverse agricultural waste, e.g. palm fronds, coconut husk, into high-performance alternative materials through a chemical-free, direct conversion process.

Key features of this process technology include:

- Eliminates the need for harsh chemical pre-treatments common in other bio-composite methods
- Produces new materials with immeasurable recyclability as a primary feedstock
- Offers broad feedstock versatility, creating materials of superior functional properties
- Adaptable to allow seamless integration into various product forms e.g., flat panels, intricate moulded components etc

POTENTIAL APPLICATIONS

The technology's primary application is in the building and construction industry, where it offers a much-needed sustainable alternative to conventional materials. This versatile technology supports a wide range of products, including but not limited to:

- Non-structural panels - engineered panels for walls, subflooring, floor tiles, providing sustainable alternatives to traditional plywood, particle board, and plasterboard.
- Insulation materials - this process yields potentially effective thermal and acoustic insulation boards or loose-fill materials for walls, and floors.
- Interior finishings – for aesthetics and decorative purposes e.g. wall panels, floor tiles, and surface coverings.
- Moulded components - the technology allows for the creation of custom-moulded elements and therefore offers design flexibility.
- Sustainable packaging – able to develop sustainable and biodegradable packaging solutions.
- Other material alternatives - includes sustainable substitutes like recycled plastic lumber and pavers, broadening the scope of eco-friendly construction possibilities.
- Recycled plastic composite materials alternatives - create advanced composite materials by blending agricultural waste with recycled plastics, enhancing properties and opening new avenues for product development.

UNIQUE VALUE PROPOSITION

- Offers sustainable impact and circularity – transforms agricultural waste into durable, recyclable materials through a green, chemical-free process, reducing landfill waste and carbon emissions.
- Cost-effective and scalable – utilises abundant, low-cost feedstock to deliver competitively priced, high-quality alternatives that reduce dependence on virgin raw materials.
- Versatile applications – provides customizable, high-performance materials suitable for diverse building and construction uses, enhancing both design flexibility and functionality.