TECH OFFER

Method For Enhancing Lignocellulosic Biomass Side Stream Pre-Treatment

KEY INFORMATION

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

TECHNOLOGY READINESS LEVEL (TRL): TRL7
COUNTRY: SINGAPORE
ID NUMBER: TO174879

OVERVIEW

Lignocellulosic biomass side streams derived from the agri-food value chain such as agricultural residues, have the potential to be converted into high-value products, including biofuel, bio-composite construction materials, and sustainable packaging. Among the various conversion processes, pre-treatment plays a crucial role in maximizing the value of lignocellulosic biomass. The primary objective of pre-treatment is to address the complex and heterogeneous structure of the biomass by removing lignin, reducing biomass size, and increasing the surface area for hydrolysis. Unfortunately, current pre-treatment methods for lignocellulosic biomass are energy-intensive, costly, and produce inhibitory compounds that impact subsequent production stages.

To overcome these challenges, this technology offers a **catalytic oxidation pre-treatment process.** This innovative approach operates under ambient or mild conditions, with a short reaction time, resulting in reduced energy consumption and treatment

costs.

The technology provider is seeking interested parties from the agricultural, biofuels, or biogas industry to license this catalytic oxidation pre-treatment process to enhance their operations and achieve a more sustainable and cost-effective production of valuable products from lignocellulosic biomass.

TECHNOLOGY FEATURES & SPECIFICATIONS

The pre-treatment technology incorporates alkaline solutions, oxidizing agents, and synthetic catalysts to break down the recalcitrant structure of biomass and release soluble lignin.

- Mild operating conditions @ **1 atm pressure and 40-50°C**
- Requires lower concentration & smaller volume of chemicals @ **< 1% (w/v)**
- Short reaction time **(2-3 hours)**
- Inhibitory compounds such as furfural and 5-HMF (Hydroxymethylfurfural) are removed in the process through oxidation

POTENTIAL APPLICATIONS

This technology is mainly applied to pre-treat residual biomass but can be extended to the following applications:

- **Lignin extraction**
- Municipal sludge
- Palm Oil Mill Effluent (POME) treatment
- Recalcitrant wastewater treatment

MARKET TRENDS & OPPORTUNITIES

The biofuel industry is expected to grow at a CAGR of 7.9% by 2033. As companies look for more sustainable fuels for vehicles that cannot be easily electrised, biofuels will be the most suitable alternative to fossil fuels to cut down on carbon emissions.

Valorization of agricultural waste that is rich in lignocellulosic cells as second-generation biofuels is also gaining prominence. Hence, this pre-treatment technology will be highly relevant in the coming years.

UNIQUE VALUE PROPOSITION

- Up to **90% energy savings** @ ambient working conditions
- No inhibitory products produced
- High selectivity on aromatic compounds such as lignin increases the delignification effectiveness