US4GREENCHEM

Combined Ultrasonic and Enzyme treatment of Lignocellulosic Feedstock as Substrate for Sugar Based Biotechnological Applications

Summary

The US4GREENCHEM project aims to design a bio-refinery concept for the complete valorisation of lignocellulosic biomass that is energy and cost-efficient and based solely on green technologies.

The project combines mechanical pre-treatment methods with ultrasound pre-treatment capable of disrupting the lignocellulosic matrix with reduced energy input and minimal production of inhibitory by-products. Ultrasound can be up to three times less energy than current approaches for lignin removal.

It will also examine further breaking down lignocellulose with carbon dioxide technologies to maximise release of sugars as the main target products.

http://www.us4greenchem.com/

Type of Action: Research & Innovation Action

Feedstock origin: Forest-based, Agri-based

Start date: 01 July 2015

End date: 30 June 2019

BBI JU contribution: € 3.457.602,50

Objectives

- Design a biorefinery concept for the complete valorisation of lignocellulosic biomass that is energy- and cost-efficient and based solely on green technologies.
- Develop ultrasound pretreatment that effectively disrupts the lignocellulosic matrix.
- Further degrade lignocellulose with CO2 technologies to maximise the release of sugars as a main target
- Develop purification and conversion strategies for lignin-based products, in order to maximise the material valorisation of the biomass components.
- Valorise the solid residues for energy production.
- Optimise the yield and reduce by 50% the cost of enzymatic hydrolysis of cellulose fibres.
- Propose an effective integration and upscaling to a pilot scale.

Expected impacts

- Developing efficient and integrated pre-treatment processes leading to a tangible reduction of costs over the entire conversion process. The project is designed to optimize every step of the conversion pathway of lignocellulosic substrates into biofuel and biomaterials: (I) physical pre-treatment, (II) hydrolysis, and (III) valorisation in order to reduce the overall processing costs of the biomass.
- Mobilizing lignocellulosic feedstock into a variety of chemicals and materials derived from all fractions of the biomass with minimum waste generation.
- Delivering fermentable sugars of suitable quality at a competitive price and with high pre-treatment yield.
- Reducing greenhouse gas emissions by at least 30% over the whole value chain of the targeted products.

Consortium

- TTZ (Germany)
- Università degli Studi di Torino (Italy)
- Weber (Germany)
- Environmental Systems GmbH (Germany)
- VTT (Finland)
- UAB Biocentras (Lithuania)
- LSIWC (Latvia)
- Feyecon (The Netherlands)
- Tecnalia (Spain)
- Jowat AG (Germany)

Project coordination

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