

Concentrated C5 and C6 Sugars from Biomass



INVENTORS • James Dumesic, David Martin Alonso, Jeremy Luterbacher

WARF: P140075US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a milder biomass pretreatment method that yields high concentrations of C5 and C6 carbohydrates and their derivatives.

OVERVIEW

Widespread production of sustainable fuels and chemicals will require cost-effective methods for breaking down biomass into its constituent sugars. Attaining high yields of concentrated C5 and C6 carbohydrates (e.g., xylose and glucose) is particularly challenging. Many processes have been tested but all have drawbacks such as very high temperatures or expensive acids and enzymes.

Clearly needed is a process for extracting both types of sugar under more practical reaction conditions.

THE INVENTION

UW-Madison researchers have developed a process for producing C5 and C6 sugars from biomass at high yields (70 to 90 percent) in a solvent mixture of water, dilute acid and GVL (gamma-valerolactone). GVL is attractive because it is effective and derived from biomass.

The biomass and solvent system may be reacted at a temperature between 50 and 250°C for less than 24 hours.

The method yields liquid and solid fractions enriched in C5 and C6 sugar, respectively. The fractions are easily separated for post-treatment upgrading. This strategy is well-suited for catalytic upgrading to furans or fermentative upgrading to ethanol at near-theoretical yield.

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.



APPLICATIONS

- Deriving C5 and C6 sugars, furfural, levulinic acid, GVL and other chemicals from biomass

KEY BENEFITS

- High yield
- High concentration
- Milder reaction conditions (i.e., low acid and temperatures)
- Cleaner C6 sugars because GVL dissolves lignin
- No purification of the C5 sugar is needed because it can be upgraded to furfural in the presence of GVL.
- Cost-effective process

STAGE OF DEVELOPMENT

Preliminary modeling indicates the overall process is cost competitive for ethanol production, with the pretreatment being followed by enzymatic hydrolysis. Importantly, the process yields a liquid fraction containing a substantial amount (sometimes more than 95 percent) of the C5 sugars present in the raw biomass.

ADDITIONAL INFORMATION

Related Portfolios

[UW–Madison Technologies Developed Through the Great Lakes Bioenergy Research Center](#)

Related Technologies

[WARF reference number P110124US01 describes a catalytic process for converting biomass into furan derivatives like levulinic acid and GVL.](#)

[WARF reference number P100099US01 describes a method for producing GVL and olefins from levulinic acid.](#)

Publications

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Tech Fields

Clean Technology - Biofuels & renewable fuels

Clean Technology - Bio-based & renewable chemicals

Materials & Chemicals - Biochemicals

CONTACT INFORMATION

For current licensing status, please contact Mark Staudt at mstaudt@warf.org or 608-960-9845.