



Converting Biomass-Derived Carbohydrates to High-Quality, Long-Chain Liquid Fuels

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a practical and energy-efficient catalytic process for producing high-quality, long-chain liquid fuels from carbohydrates.

Overview

Alkanes produced from carbohydrates could provide a renewable source of transportation fuel to complement the rapidly growing production of bio-diesel from vegetable oils and animal fats.

The Invention

UW-Madison researchers have developed a practical and energy-efficient catalytic process for producing high-quality, long-chain liquid fuels from carbohydrates. The multi-stage process uses combinations of self- and crossed-aldol condensation reactions, dehydration reactions and hydrogenation reactions to yield alkane, alkene and ether products.

Preferably, this process starts with an acid-catalyzed dehydration of biomass-derived carbohydrates. Then an aqueous-phase aldol condensation reaction yields large organic compounds, which are converted into long-chain alkanes via dehydration and/or hydrogenation. The aldol condensation reaction takes place in the presence of a stable, recyclable and solid-base catalyst, which is comprised of magnesium, zirconium, oxygen and possibly palladium.

Applications

- Biofuel production
- Production of useful feedstocks for making organic chemicals

Key Benefits

- Alkanes can be used as sulfur-free fuel components
- Aldol condensation reactions occur in the aqueous phase, enabling the generation of alkanes from renewable resources
- Unlike the conversion of glucose to ethanol, this reaction does not require an energy-intensive distillation step—alkanes spontaneously separate from the aqueous solvent
- Environmentally friendly
- Catalyst maintains significant activity after recycling and is potentially useful in other aqueous-phase catalyzed reactions
- Reactions are appropriate for many types of reactors, including batch, semi-batch and continuous flow reactors

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For More Information About the Invention

- [George Huber](#)

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Tech Fields

- [Clean Technology : Biobased & renewable chemicals & fuels](#)
- [Materials & Chemicals : Synthesis](#)

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854

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