



One-Step Process Turns Biomass into Hydrocarbon Building Blocks

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a mild process for converting lignocellulose biomass into furfural-/HMF-acetone adducts that can be made into liquid hydrocarbon fuels.

Overview

Much research has focused on transforming biomass sugars into building block molecules like hydroxymethylfurfural (HMF) and furfural. HMF and furfural are versatile substitutes for a range of chemicals traditionally derived from petroleum.

HMF and furfural also can be turned into longer-chain hydrocarbons. For example, condensation of HMF/furfural and acetone is able to extend the carbon number of the resulting hydrocarbon up to 20, which is similar to the makeup of gasoline, jet fuel and diesel.

Problematically, methods for forming and using HMF have relied on expensive chemicals, solvents and multiple steps.

The Invention

UW–Madison researchers have developed a process for converting biomass to furfural-/HMF-ketone precursors that then may be turned into long-chain hydrocarbons.

The method, called HDA (Hydrolysis-Dehydration-Aldol condensation), streamlines several conversion processes into a single step. First, a ketone (like acetone) is used as a solvent with lithium bromide or other halide salt, water and acid. The mixture is reacted with biomass under mild conditions to yield furfural-/HMF-ketone adducts.

The adducts then may be converted into hydrocarbons by standard hydrodeoxygenation methods.

Applications

- Biofuel production

Key Benefits

- Direct, cheap and streamlined conversion
- No pretreatment nor prior saccharification of biomass
- Low heat and pressure
- Initial conversion step can achieve yields of 95 percent or higher.
- The ketone and salt can be recycled and reused.

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Stage of Development

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The HDA process has been shown to be effective with softwood, spruce, hardwood poplar, corn stover, switchgrass and waste paper.

Additional Information

For More Information About the Inventors

- [Xuejun Pan](#)

Related Technologies

- [WARF reference number P08210US describes a two-step process for converting lignocellulosic biomass into useful fuels and chemicals, such as HMF or DMF.](#)

Tech Fields

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

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

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