

# Low Temperature Hydrogen Fuel Production Using Renewable Starting Materials



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**WARF: P01411US**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an efficient and environmentally friendly way to generate hydrogen fuel from abundant and fully renewable resources like plant biomass.**

## OVERVIEW

Because water vapor is the only emission when hydrogen is burned as fuel, hydrogen holds great promise as a future “green” energy source. However, while hydrogen itself is an environmentally friendly fuel, current industrial methods for making hydrogen consume non-renewable hydrocarbons (e.g. methane) and produce significant amounts of polluting emissions (e.g. carbon dioxide). These processes also require several reaction steps in separate reactors, use flammable starting materials and take place at high temperatures.

## THE INVENTION

UW-Madison researchers have developed a method to generate hydrogen fuel through low-temperature, catalytic steam reforming of oxygenated hydrocarbons, such as ethanediol, glycerol, sorbitol, glucose and ethanol. Unlike conventional starting materials for hydrogen production, which come from natural gas, oxygenated hydrocarbons can be derived from renewable resources, like plant biomass. Moreover, although the inventors’ method also produces carbon dioxide as a byproduct, the use of plant biomass should reduce the net release of CO<sub>2</sub> to the atmosphere, because plants fix and store CO<sub>2</sub> in their biomass during growth.

## APPLICATIONS

- Production of hydrogen from biomass

## KEY BENEFITS

- Provides an efficient and environmentally friendly way to generate hydrogen from abundant and fully renewable resources, like plant biomass

## 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.



- Unlike conventional methods that use highly flammable starting materials, this method generates hydrogen from non-toxic, non-flammable compounds, like sugars.
- Greater energy efficiency – reaction functions at lower temperatures for higher net energy return
- Yields hydrogen that is free from impurities, such as sulfur and carbon monoxide
- Hydrogen produced by this method is suitable for any hydrogen-requiring application, including fuel cells, ammonia production and crude oil refinement.
- Simple – provides a one-step, single reactor process
- Low temperatures, benign starting materials and single reactor make process well suited to portable applications and home use.

## ADDITIONAL INFORMATION

### Tech Fields

Clean Technology - Biofuels & renewable fuels

Materials & Chemicals - Synthesis

## CONTACT INFORMATION

For current licensing status, please contact Mark Staudt at [mstaudt@warf.org](mailto:mstaudt@warf.org) or 608-960-9845.

