Process for Converting Waste Biomass

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ABSTRACT

A researcher at the University of California, Davis has developed a chemical approach for the total conversion of plant carbohydrates to biofuels and value-added products.

FULL DESCRIPTION

A researcher at the University of California, Davis has developed a process for converting waste biomass (agricultural, municipal forestry) into 5-chlorofurfural (CMF) in yields approaching 90% of the theoretical. Thus far no other method of biomass deconstruction gives such a high conversion to a simple organic product. The process is completely chemical in nature and inexpensive. Conditions are mild (T≤ 100 °C) and reaction times are short (≤ 4 h). By reaction with ethanol or hydrogen, the CMF product is converted into 5-ethoxymethyl furfural and 5-methylfurfural, respectively, both of which are promising biofuel candidates, and the former of which is currently being commercialized in Europe as a diesel additive. By reaction with water, the CMF product is converted into levulinic acid, an industrially important value-added chemical. A secondary product of this process is furfural itself, which derives from the hemicellulose content of plant biomass. Furfural is currently traded as a commercial commodity.

APPLICATIONS

- High yield process for the development and manufacture of renewable alternative fuels

FEATURES/BENEFITS

- More efficient than conventional ethanol production
- Direct utilization of cellulose, a prevalent and available source of carbon
- Derived biofuels are hydrophobic, non-toxic, non-volatile, non-corrosive, clean-burning, and biodegradable
- Method can be used to derive either biofuels or value added materials from biomass

RELATED MATERIALS

- Mascal M and Nikitin EB. 2008. Direct, high-yield conversion of cellulose into biofuel. Angew Chem Int Ed Engl. 47(41):7924-6.
- Mascal M and Nikitin EB. 2009. Towards the Efficient, Total Glycan Utilization of Biomass. ChemSusChem. 2(5):423-426. [Epub ahead of print]

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,829,732	11/09/2010	2008-516

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Preparation of Furan Fatty Acids from 5-(Chloromethyl) Furfural
- Synthetic, Non-Scheduled, Cannabinoid for Reducing the Frequency and Severity of Seizure

INVENTORS

- Mascal, Mark J.

OTHER INFORMATION

KEYWORDS

biofuels, sustainable chemistry, biomass conversion, carbohydrates, cellulose, furfural, furans

CATEGORIZED AS

- **Biotechnology**
  - Industrial/ Energy
- **Energy**
  - Bioenergy
  - Other

RELATED CASES

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