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Novel Catalysts for Use in Direct Production of Sugar Acids and Sugar Oligomers from Cellulosic Biomass

Tech ID: 24319 / UC Case 2014-855-0

ABSTRACT

A method of production of sugar oligosaccharides and sugar oligosaccharide adonic acids directly from inexpensive cellulosic biomass. Researchers have engineered a fungus that can directly produce sugar oligosaccharides and/or sugar oligosaccharide adonic acids from cellulose without any addition of exogenous cellulase. Sugar oligosaccharide adonic acids are valuable chemicals numerous applications in the pharmaceutical, cosmetic, food and chemical industries. Sugar oligosaccharides can be used as feedstock for further fuels and chemicals production.

FULL DESCRIPTION

Researchers at the University of California have created a metabolically engineered mutant form of the *Neurospora crassa* fungus that can produce sugar oligosaccharides (such as cellobiose) or sugar oligosaccharide adonic acids (such as cellobionate) directly from biomass (cellulose) without the addition of cellulase or any other enzymes, using one single step and thereby eliminating costly steps in biofuel production from biomass.

Cellulosic biomass is an abundant and sustainable source for organic fuels and chemicals. However, widespread use of cellulosic biomass has been restrained by a lack of efficient, low-cost biomass processing technology. The traditional method for converting cellulosic biomass to biofuels includes pretreatment, cellulase production, and enzymatic hydrolysis steps to produce the sugars required for fermentation into biofuels and chemicals. The new approach developed in UCD replaces these costly steps with one single fermentation step using a genetically engineered fungus, and hence has the potential to drastically lower the processing cost. The approach is able to generate sugar oligosaccharides, which can be the sugars for subsequent fuel and chemical production. It can alternatively generate oligosaccharide adonic acids as well, high-value chemicals with broad application in the food, cosmetics, pharmaceutical and chemical industries.

APPLICATIONS

- ▶ Fungus can be used to produce sugar oligosaccharides and produce sugar oligosaccharide adonic acids from cheap and abundant biomass
- ▶ Sugar oligosaccharides (cellobiose) can be used for production of biofuels and other chemicals
- ▶ Sugar oligosaccharide adonic acids are highvalue chemicals which have broad applications in the food, cosmetics, pharmaceutical and chemical industries

FEATURES/BENEFITS

- ▶ Cheap alternative to the traditional method of sugar production for use in production of biofuels and chemicals
- ▶ Direct production of high value sugar oligosaccharides adonic acids
- ▶ Catalyst eliminates the need of costly cellulase enzyme production and treatment by directly degrading lignin and hydrolyzing cellulose and hemicellulose from the cellulosic biomass to isolate the needed sugars
- ▶ Use of this fungus will ultimately lead to cheaper and more efficient production of biofuels and other organic chemicals

RELATED MATERIALS

- ▶ [Engineering *Neurospora crassa* for improved cellobiose and cellobionate production](#) - 11/07/2014

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,358,668	07/23/2019	2014-855

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OTHER INFORMATION

KEYWORDS

cellulosic biomass, biofuels, cellobiose, cellobionic acids, cellulase, fungus, renewable energy, ethanol production, transgenic, high value chemicals

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Industrial/ Energy
- ▶ **Energy**
 - ▶ Bioenergy
- ▶ **Materials & Chemicals**
 - ▶ Chemicals
- ▶ **Agriculture & Animal Science**
 - ▶ Chemicals

RELATED CASES

2014-855-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [A novel integrated process for biofuels and chemicals from cellulosic biomass](#)

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