



Powerful New Enzyme for Transforming Biomass

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WARF: P120371US02

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a multifunctional enzyme that can hydrolyze cellulose, xylan, mannan and cellulose III.

Overview

Converting plant cellulose and hemicellulose into fermentable sugars is a major bottleneck in the biofuel industry. Chemical pretreatment and enzyme hydrolysis (breakdown) usually are required.

Among chemical pretreatments, ammonia fiber expansion (AFEX) alkaline pretreatment has many advantages. For example, it is a dry process and results in cleaved lignin-carbohydrate complexes without physical extraction. A variation on the process, called extractive AFEX, leads to the production of 'cellulose III,' an artificial form of cellulose that may be easier to break down.

To be effective, these pretreatments must be paired with enzyme cocktails. As many as 18 different purified enzymes may be required for high yield conversion. Fewer enzymes would simplify biofuel production and lower costs. One approach is to swap out two or more single-function enzymes for a multifunctional enzyme.

The Invention

UW-Madison researchers have engineered a multifunctional polypeptide capable of hydrolyzing cellulose, xylan and mannan. It is made of the catalytic core of *Clostridium thermocellum* Cthe_0797 (also called CelE), a linker region and a cellulose-specific carbohydrate binding module (CBM3).

C. thermocellum is a well-known cellulose-degrading bacterium whose genome has been sequenced, annotated and published.

Applications

- Biofuel production
- Hydrolyzing cellulosic materials including filter paper, crystalline cellulose allomorph I, amorphous cellulose, cellulose III and SIGMACELL
- May be used to improve animal fiber digestion

Key Benefits

- Superior catalytic activity
- Less complex enzyme cocktails

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Stage of Development

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The new enzyme's catalytic reactivity has been shown to be twice as high as native CelE.

Additional Information

For More Information About the Inventors

- [Brian Fox](#)

Related Technologies

- [WARF reference number P08301US02 describes a cell-free system that can be used to discover and produce target polypeptides capable of biomass conversion.](#)

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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