



## Enhanced Biomass Digestion with Wood Wasp Bacteria

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**WARF: P110314US03**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing methods for deconstructing lignocellulose using secretions from the *Streptomyces* species 'ActE.'**

### Overview

Plant biomass represents a vast and renewable source of energy. However, harnessing this energy requires breaking down tough lignin and cellulose cell walls. In nature, certain microbes can deconstruct biomass into simple sugars by secreting combinations of enzymes.

Two organisms that utilize cellulose are *Clostridium thermocellum* and *Trichoderma reesei*. Both are well-known and relied upon in the biomass field. Yet research suggests another microorganism, of the *Streptomyces* bacteria group, may hold previously unrecognized potential.

*Streptomyces* species ActE is associated with a destructive wood-eating wasp and could represent a new source of cellulose-degrading enzymes.

### The Invention

UW–Madison researchers have derived preparations from ActE secretions that highly degrade lignocellulose. The bacteria can be obtained from *Sirex noctilio* wasps and grown on a substrate containing mostly cellulose, hemicelluloses, xylan, wood or non-wood biomass, and chitin. The substrate may be pretreated for better results. The ActE are grown aerobically to maximize the secretion of both oxidative and hydrolytic enzymes capable of rapid deconstruction of matter. The secretions can be purified and added directly to biomass slurry.

### Applications

- Biofuels
- Converting cellulosic biomass to cellobiose and xylose
- Converting paper waste to readily fermentable saccharides
- Animal feeds with easier digestibility
- Processing shellfish chitin into soluble constituents
- Converting mannan-enriched material to mannose and mannobiose
- Commercial food processing

### Key Benefits

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- Secretions provide a natural source of cellulose-degrading enzymes.
- Proteins can be purified directly from secretions without tags or recombinant means.
- ActE is able to grow in a wide range of pH.

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- Bacteria can be genetically modified to achieve proteolysis-proof secretions.

## Stage of Development

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

## Additional Information

### For More Information About the Inventors

- [Cameron Currie](#)
- [Brian Fox](#)

### Related Technologies

- [WARF reference number P08193US describes a biomass pretreatment method called SPORL \(Sulfite Pretreatment to Overcome Recalcitrance of Lignocellulose\) that reduces the energy required before enzymatic breakdown can occur.](#)

### Related Intellectual Property

- [View Continuation Patent in PDF format.](#)

### Publications

- Takasuka T.E., Book A.J., Lewin G.R., Currie C.R. and Fox B.G. 2013. Aerobic Deconstruction of Cellulosic Biomass by an Insect-Associated Streptomyces. Sci Rep. 3, 1030.

### Tech Fields

- [Clean Technology : Biobased & renewable chemicals & fuels](#)
- [Research Tools : Microbial technologies](#)

For current licensing status, please contact Jennifer Gottwald at [jennifer@warf.org](mailto:jennifer@warf.org) or 608-960-9854

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