



## **Technology Commercialization Opportunity**

### Genes and Gene Clusters that Enable Degradation of Recalcitrant Biological Materials

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Intellectual Property Status: PCT Application filed

#### **Introduction**

The abundant and renewable nature of cellulose containing plant material, gives it the potential to become quite commercially valuable. For example, cellulose and lignocellulose can be used in the production of biofuel, thermoplastics, and many different chemicals. Because the very function of cellulose is to provide structure, it has naturally evolved to resist enzymatic degradation. Consequently, the increase in production costs associated with the multiple processing steps required to break down cellulose into a material that is readily used is commercially limiting. Thus, the economic feasibility of using cellulose-based starting material is contingent on the development of methods to reduce the number of processing steps required to convert cellulosic material into biofuel and other commercially desirable materials.

#### **Technology Summary**

Researchers at the University of Georgia have developed methods to exploit a group of genes, collectively referred to as the *plant biomass utilization* (PBU) genes, which allow for untreated plant biomass and/or spent biomass to be utilized directly for biomass conversion. In addition, these genes are not limited to a single organism, but can be expressed in various organisms (including extremophiles) through genetic manipulation. The products of biomass conversion using this approach are suitable for biofuels, polymers, or commodity chemicals normally derived from plant based materials.

#### **Advantages**

- Eliminates requirement for pretreatment of cellulosic plant biomass
- Production of biofuels from cellulosic materials more economically feasible
- PBU genes can be expressed in a variety of organism (such as *Pyrococcus*) including mesophiles and the thermophile *Anaerocellum thermophilum*
- Possibility of extracting energy from biomass typically left unexploited (i.e. spent biomass)

#### **Potential Applications**

- Direct biomass conversion of cellulosic containing material into commodity chemicals and biofuels (including H<sub>2</sub> and alcohols) without requiring pretreatment steps

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