



# Biomass Program

## Pretreatment and Enzymatic Hydrolysis

The Pretreatment and Enzymatic Hydrolysis project investigates various pretreatment approaches that are aimed at reducing the cost of biomass pretreatment and increasing the enzymatic digestibility of residual cellulose and hemicellulose in pretreated biomass. Activities in this project are aimed at overcoming barriers associated with high capital and operating costs and sub-optimal sugar yields resulting from pretreatment and subsequent enzymatic hydrolysis of biomass. The effect of the different pretreatment approaches on the enzymatic digestibility of pretreated biomass residues is being evaluated with the goal of lowering the overall costs of saccharifying biomass that are associated with pretreatment and enzyme usage. Several activities being conducted utilize the capabilities of the Biomass Surface Characterization Laboratory in order to better understand compositional and structural impacts of pretreatment and enzymatic hydrolysis across various pretreatment chemistries and feedstocks.

Specific activities in the Pretreatment and Enzymatic Hydrolysis project include:

- Logistical support and leveraged R&D activities

associated with the Biomass Program-funded Consortium for Applied Fundamentals and Innovation (CAFI) project that compares several leading pretreatment approaches across selected feedstock on a comparative basis.

- Development of an experimental apparatus and methodology that identifies the relative combined pretreatment and enzymatic hydrolysis reactivity of selected high-volume feedstocks across a range of pretreatment process chemistries and conditions.
- Investigation of fundamental process slurry rheological properties to enable the development and testing of high solids saccharification equipment systems and process options.
- Fundamental studies to better understand structural and surface effects caused by pretreatment of biomass and use of this knowledge to identify and target required enzyme activities and loadings to improve the economic efficiency of the enzymatic saccharification of pretreated biomass.

These activities are all highly integrated with the other core R&D projects of the Biomass Program's Biochemical Platform.

## Biochemical R&D

### Benefits

- Enable the development of more cost-effective pretreatment and enzymatic hydrolysis technologies

### Applications

This project provides pretreatment and enzymatic hydrolysis data and knowledge to programmatic stakeholders.

### Project Participants

National Renewable Energy Laboratory

### Project Period

FY 2006 - 2009

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