

January-March 2005, #6

The Sugar Platform Integration Task focuses on integrating the processing steps involved in enzyme-based lignocellulose conversion technology. This project supports the U.S. Department of Energy's efforts to foster development, demonstration, and deployment of "sugar platform" biorefineries that produce inexpensive commodity sugars and fuel ethanol, as well as a variety of other fuel and chemical products, from abundant renewable lignocellulosic biomass.

The National Renewable Energy Laboratory manages this project for DOE's Office of the Biomass Program. Information on the Biomass Program is available at [Biomass Program](#)

To discuss information in this update or for further information on the Sugar Platform Integration Project, contact Dan Schell at NREL, phone (303) 384-6869, email dan_schell@nrel.gov

The 27th Symposium on Biotechnology for Fuels and Chemicals is Coming. The premier conference series on biotechnology for fuels and chemicals continues with the 27th Symposium, May 1-4 in Denver, Colorado. Please visit the web site for schedule, registration and hotel information. This year's sessions are listed below:

Session 1A Feedstock Supply and Logistics
Session 1B Enzyme Catalysis and Engineering
Session 2 Today's Biorefineries
Session 3A Plant Biotechnology and Feedstock Genomics
Session 3B Biomass Pretreatment and Hydrolysis
Session 4 Industrial Biobased Products
Session 5 Microbial Catalysis and Metabolic Engineering
Session 6 Bioprocess R&D
Special Topic A International Energy Agency Task #39-Liquid Biofuels
Special Topic B Bioenergy Life-Cycle Analysis/Economics of Sustainability

The Symposium web site can be found at the link provided below.

http://www.eere.energy.gov/biomass/biotech_symposium/

The following posters will be presented at the Symposium and are authored or coauthored by project members and may be of interest to readers of this newsletter.

"High-Solids Enzymatic Saccharification of Cellulose." D. Hodge, M. Karim, (Colorado State University), and J. Farmer, D. Schell D, J. McMillan (NREL)

"Factors Affecting Scale-up of High Solids Saccharification from Shake Flasks to Stirred Tank Reactors." D. Hodge, M. Karim (Colorado State University), and A. Mohagheghi, J. Baker, D. Schell, J. McMillan (NREL)

"Assessing the Value of a Targeted Corn Stover Harvest by Understanding the Distribution of Inorganic Nutrients," T. Schechinger (Ironhorse Farms), and S. Thomas (NREL)

"Corn Stover Quantity and Composition as Influenced by Agronomic Practices." M. Montross, C. Crofcheck, S. Shearer, D. Hancock (University of Kentucky), and B. Hames (NREL)

"The Screening of Biomass Pretreatment of Processes and Analysis of Hydrolysates Using New HPLC Methods." F. Agblevor, A. Murden (Virginia Polytechnic Institute and State University), and B. Hames, D. Schell, H. Chum (NREL)



“Characterization and Thermogravimetric Analysis of Corn Stover SSF-Residues.” S. Kim, F. Agblevor (Virginia Polytechnic Institute and State University), and B. Hames, D. Schell (NREL)

“Automating Biomass Analysis using Accelerated Solvent Extraction.” J. Sluiter, C. Scarlata, A. Sluiter, B. Hames, N. Thanh (NREL)

“Sugar Degradation During Analytical Biomass Hydrolysis.” W. Heilbut, (Ohio State University), and C. Scarlata (NREL)

R&D Progress

Work Continues to Advance Understanding of Corn Stover Variability. We are continuing work to understand the breath of corn stover compositional variability with the goal of understanding the impact of variability on integrated process performance. To this end, the composition of an additional 1500 corn stover samples have been measured and added to the database over the last few months. The results will be used to understand the impact of feedstock variability on pretreatment and enzymatic cellulose hydrolysis yields, which ultimately has an effect on process cost. Currently, several hundred more samples have been milled and will be analyzed by near-infrared (NIR) spectroscopy to determine their composition. We will also re-analyze all samples using an improved NIR model relating spectroscopic information to stover composition. Detailed results are expected by the end of April.

Work Initiated to Understand the Impact of Effluent Recycle on Process Performance.

We started a new effort this year to examine the impact of using a process effluent stream, specifically the distillation column stillage, or what is known as backset in the corn-to-ethanol industry, to provide makeup water for the conversion process. Economic modeling has determined that significant cost reductions can be achieved by recycling a portion of the stillage stream. However, this may increase the concentration of organic and ionic compounds in the fermentors to levels that inhibit fermentative microorganisms. The goal of this work is to determine the impact of stillage usage on fermentation performance. Fermentation of dilute-acid pretreated corn stover hydrolysate is being conducted using a recombinant glucose/xylose fermenting *Z. mobilis*. Initial work on a dilute hydrolysate stream, and low level of stillage usage (10% of the stillage stream) showed no negative impact on ethanol yield. Future work will be done using more concentrated hydrolysate streams and at higher stillage recycle ratios.

Related Activities

New Biomass Surface Characterization Laboratory Dedicated. Doug Kaempf, Biomass Program Manager for the Department of Energy, and Jim Spaeth, DOE GO Project Management Center Director visited NREL on January 18–19th, 2005. As part of this visit Doug Kaempf dedicated a new Biomass Surface Characterization Laboratory (BSCL). In his dedication speech he challenged NREL and the other DOE NBC laboratories to make sure that the BSCLs top flight research equipment be utilized in a manner that maximizes benefit to the Biomass Program and to the program’s industrial partners. More information on this new



laboratory facility can be found in a recent presentation that can be accessed at the following link: <http://www.devafdc.nrel.gov/biogeneral/FNCGate> (Biomass Surface Characterization Task presentation at the bottom of the page).

Sugar Processing Integration Task Information. Web-based information on the process integration project, including our presentations from the most recent stage gate interim review meeting, can be found at the following link ([Process Integration Project Information](#)). A discussion of how Stage Gate management is used in the Biomass Program is also available at this site ([Stage Gate Management](#)).

Produced for the



U.S. Department of Energy
**Energy Efficiency
and Renewable Energy**

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1000 Independence Avenue, SW, Washington, DC 20585
by the National Renewable Energy Laboratory, a DOE national laboratory

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

DOE/GO-102005-2087 • April 2005



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