



Mascoma Announces Major Cellulosic Biofuel Technology Breakthrough

Lebanon, NH - May 7, 2009: Mascoma Corporation today announced that the company has made major research advances in consolidated bioprocessing, or CBP, a low-cost processing strategy for production of biofuels from cellulosic biomass. CBP avoids the need for the costly production of cellulase enzymes by using engineered microorganisms that produce cellulases and ethanol at high yield in a single step.

“This is a true breakthrough that takes us much, much closer to billions of gallons of low cost cellulosic biofuels,” said Michigan State University’s Dr. Bruce Dale, who is also Editor of the journal *Biofuels, Bioproducts and Biorefineries*. “Many had thought that CBP was years or even decades away, but the future just arrived. Mascoma has permanently changed the biofuels landscape from here on.”

In a recent *Forbes* article, biofuels expert Helena Chum of the National Renewable Energy Laboratory in Golden, Colorado, commented on CBP, saying “This is the golden dream. All of the processes in one super-organism. That would be the lowest cost possible.” A prominent DOE/USDA research agenda states that “CBP is widely considered to be the ultimate low-cost configuration for cellulose hydrolysis and fermentation.”

Multiple research advances presented by Mascoma Chief Technology Officer Dr. Mike Ladisch at the 31st Symposium on Biotechnology for Fuels and Chemicals in San Francisco provide proof of concept for CBP. These include advances with both bacteria that grow at high temperatures, called thermophiles, and recombinant cellulolytic yeasts such as:

Thermophilic Bacteria

- Production of nearly 6% wt/vol ethanol by an engineered thermophile, an increase of 60% over what was reported just a year ago;

- The first report of targeted metabolic engineering of a cellulose-fermenting thermophile, *Clostridium thermocellum*, leading to a reduced production of unwanted organic acid byproducts; and
- Selected strains of *C. thermocellum* that can rapidly consume cellulose with high conversion and no added cellulase, and grow on cellulose in the presence of commercial levels of ethanol.

Recombinant, Cellulolytic Yeast

- 3,000-fold increase in cellulase expression;
- A significant 2.5-fold reduction in the added cellulase required for conversion of pretreated hardwood to ethanol; and
- Complete elimination of added cellulase for conversion of waste paper sludge to ethanol.

“These advances enable the reduction in operating and capital costs required for cost-effective commercial production of ethanol, bringing Mascoma substantially closer to commercialization,” said Jim Flatt, Executive Vice President of Research, Development and Operations at Mascoma. “Our results go a long way toward establishing the feasibility of the processing concept that we have built our company around - so this is a big day for us.”

In February 2009, Mascoma announced that its pilot facility in Rome, NY had begun producing cellulosic ethanol. The demonstration facility, which was constructed with the generous support from the State of New York through the NYS Department of Agriculture & Markets and the New York State Energy Research and Development Authority, has the flexibility to run on numerous biomass feedstocks including wood chips, tall grasses, corn stover (residual corn stalks) and sugar cane bagasse. The facility will provide process performance engineering data sufficient to support construction of 1/10th scale and commercial scale biorefineries in Kinross, MI, with support from the Department of Energy and State of Michigan.

About Mascoma

Mascoma Corporation is an innovative biofuels company committed to developing environmentally sustainable, low cost, low carbon biofuels from cellulosic biomass. The company's Consolidated Bioprocessing method converts non-food biomass feedstocks

into cellulosic ethanol through the use of a patented process that eliminates the need for costly enzymes and additives. The company's corporate office and R&D laboratories are based in Lebanon, New Hampshire. Mascoma is producing cellulosic ethanol on a demonstration scale at its facility in Rome, New York. Its affiliate, Frontier Renewable Resources, is developing a commercial scale production facility in Kinross, Michigan. For more information, visit www.mascoma.com.

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