FAST MOVING FRONTS - 2009

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Michael R. Ladisch talks with *ScienceWatch.com* and answers a few questions about this month's Fast Moving Front in the field of Microbiology.

Article: Features of promising technologies for pretreatment of lignocellulosic biomass
Authors: Mosier, N;Wyman, C;Dale, B;Elander, R;Lee, YY;Holtzapple, M; Ladisch, M
Journal: BIORESOURCE TECHNOL, 96 (6): 673-686 APR 2005
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(addresses have been truncated)

SW: Why do you think your paper is highly cited?

The conversion of non-food renewable resources (i.e., lignocellulosics) to biofuels is a key area of interest. This paper gives an interpretative summary and comparison of key advances and challenges to the economical transformation of agricultural cellulosic residues to ethanol. The information is presented by a team of accomplished researchers in the field, giving the paper a sense of depth.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

It describes the recent developments of leading pretreatments for softening up the structure of cellulosic materials so that they are susceptible to enzymes that break the cellulose down to fermentable sugars.

"If this helps to reduce costs, it will also bring cost-effective commercial facilities on-line sooner, thereby helping to mitigate the generation of greenhouse gasses."

SW: Would you summarize the significance of your paper in layman's terms?

The paper shows that pretreatment of cellulose opens up its structure to enzyme hydrolysis, and enables major enhancements in the yields of sugars and alcohols from cellulosic feedstocks over material that is not pretreated. Acid, base, and near-neutral pH pretreatments are being examined, and in many cases are equivalent.

SW: How did you become involved in this research and were any particular problems encountered along the way?

This is a team effort among researchers who have each worked in the field for 20 years or more. Pretreatment is a key step, and its application to a range of cellulosic feedstocks must be understood for a successful (cost-effective) cellulose hydrolysis process to be scaled up.

SW: Where do you see your research leading in the future?

The methodology employed by my team will examine other substrates (feedstocks) to better understand how differences in composition and structure of divergent materials—for example, wood vs. switchgrass or corn stover—affect pretreatment and hydrolysis.

SW: Do you foresee any social or political implications for your research?

We believe this will assist the complex process of developing, selecting, and scaling-up steps that are at the front end of the processing system which transforms cellulosic materials to ethanol. If this helps to reduce costs, it will also bring cost-effective commercial facilities on-line sooner, thereby helping to mitigate the generation of greenhouse gasses.

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KEYWORDS: DILUTE-ACID PRETREATMENT; BIOFUELS; COMPRESSION-MILLING PRETREATMENT; STEAM-EXPLOSION PRETREATMENT; ENHANCE METHANE FERMENTATION; RECYCLED PERCOLATION PROCESS; ENZYMATIC-HYDROLYSIS; ETHANOL-PRODUCTION; SULFURIC-ACID; THERMOCHEMICAL PRETREATMENT; LIME PRETREATMENT.

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