

Enzymatic Production and Conversions

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This session consisted of 7 oral and 35 poster presentations focusing on various aspects of microbial enzyme production and performance for biomass conversions. Representing research conducted in 15 countries, the research touched on the use of enzymes for all areas of biomass conversion, including pretreatment, hydrolysis, and conversion to chemical feedstocks. Applications of enzymes for the production of oleochemicals and pharmaceuticals were also described. To be commercially viable, any enzymatic process must utilize an efficient mix of process-compatible enzyme activities; the enzymes must be produced at high level from the host organism, recovered with minimal cost, and result in a minimum of unwanted side products. The hydrolysis of different biomass materials will require different enzyme mixes, and the future challenge will be to meet this requirement in a cost-effective manner. Improved methods were presented to analyze complex enzyme mixtures secreted by efficient cellulolytic organisms that will likely prove critical to meeting this requirement. While the characterization of enzyme mixtures secreted by naturally occurring organisms presented in this session will likely greatly improve our understanding of how naturally occurring organisms degrade various biomass substrates, it is generally recognized that pretreated biomass may require different, synthetic mixes of enzymes from diverse organisms. Making such mixtures depends on building a toolbox of candidate enzyme activities that can work under similar process conditions, and the identification and cloning of novel enzyme activities remains a primary focus of research groups worldwide. Other work exploring the immobilization of enzymes, the use of alternate hosts such as plants, and changes in biomass structural characteristics during enzymatic hydrolysis were also presented and add to our knowledge base for future explorations of the use of enzymes in converting renewable resources to bulk and fine chemicals, agrochemicals, and pharmaceuticals.

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