Session 2

Microbial Catalysis and Metabolic Engineering

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Thirty-seven outstanding papers related to the application of naturally occurring or genetically modified microorganisms as catalysts for the conversion of sugars from various feedstocks, particularly from cellulosic biomass, to industrial products were selected for presentation in the *24th Symposium on Biotechnology for Fuels and Chemicals*. As in previous years, for a variety of reasons, many excellent papers presented at the symposium were not published in this volume. For the readers who did not attend the Symposium, the complete program can be viewed at the websites provided in the Introduction to the Proceedings (this volume). Among the submitted papers, seven were selected for oral presentation in this session and the rest were presented in the poster Session. Approximately half of the papers were related to biofuel, particularly cellulosic ethanol production, and the remainder dealt with the production of chemicals. The selection of papers for oral presentation was based on the criteria described below. In general, papers reporting innovative ideas for cellulosic biomass conversion and the use of new cutting-edge technologies for the study of microbial catalysis were preferentially selected for oral presentation. In addition, a few papers regarding recent advances in metabolic engineering of the *Saccharomyces* yeast for fermenting cellulosic sugars to ethanol were also selected for oral presentation. More papers submitted to this year's Symposium were related to further improving metabolically engineered *Saccharomyces* yeast for cellulosic ethanol production than any other microorganism. Since the attempt to metabolically engineer the *Saccharomyces* yeast to ferment xylose was initiated more than 20 years ago, great progress has been made on this difficult and seemingly doomed task. Thanks to persistent scientists, genetic engineering of the *Saccharomyces* yeast for cellulosic ethanol production was ultimately successful. Further validating this research, the US Department of Energy recently recommended that the metabolically

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engineered *Saccharomyces* yeast is still the choice microorganism for the production of cellulosic ethanol, owing to its robustness and proven industrial record for fermenting glucose to ethanol.

Other key microbial presentations focused on the possibilities of "consolidated bioprocessing" (using one fermentation to perform the complete hydrolysis to fermentation), further platform biochemicals (e.g., succinic acid), and novel microbes (marine organisms). Dr. Chatterjee of CoDexis/Maxygen describe R&D and applications of gene shuffling to create new and variant pathways. These presentations show the value to exploiting both traditional microbes, such as yeast, as well as new capabilities.