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Dr. Jin received his B.S.and M. S. in Food Science and Technology at Seoul National University 1996 and 1998, respectively. In 2002 he received Ph. D. degree in Food Science and Bacteriology (minor) at the University of Wisconsin-Madison under the advisement of Prof. Thomas Jeffries. After completing a post-doctoral training under the advisement of Prof. Gregory Stephanopoulos at Massachusetts Institute of Technology, he served as an Assistant Professor in the Department of Food Science and Biotechnology at Sungkyunkwan University in Korea from 2006 to 2008. In August of 2008, he joined the faculty of Food Science and Human Nutrition as an Assistant Professor in Microbial Genomics.

Title: Metabolic engineering of Saccharomyces cerevisiae for producing cellulosic biofuels

Abstract:
The use of plant biomass for biofuel production will require efficient utilization of the sugars in lignocellulose, primarily glucose and xylose. However, strains of S. cerevisiae presently used in bioethanol production ferment glucose but not xylose. Yeasts engineered to ferment xylose do so slowly, and cannot utilize xylose until glucose is completely consumed. To overcome these bottlenecks, we engineered yeasts to coferment mixtures of xylose and cellobiose. After constructing an efficient xylosefermenting strain of S. cerevisiae through rational and combinatorial strategies, we introduced a novel cellobiose utilizing pathway into the xylosefermenting strain. In this yeast strain, hydrolysis of cellobiose takes place inside yeast cells through the action of an intracellular ß-glucosidase following import by a high-affinity cellodextrin transporter. Intracellular hydrolysis of cellobiose minimizes glucose repression of xylose fermentation allowing co-consumption of cellobiose and xylose. The resulting yeast strains, co-fermented cellobiose and xylose simultaneously and exhibited improved ethanol yield when compared to fermentation with either cellobiose or xylose as sole carbon sources. We also observed improved yields and productivities from cofermentation experiments performed with simulated cellulosic hydrolyzates, suggesting this is a promising co-fermentation strategy for cellulosic biofuel production. The successful integration of cellobiose and xylose fermentation pathways in yeast is a critical step towards enabling economic biofuel production from lignocellulosic biomass.