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Engineering on wild type diploid *Saccharomyces cerevisiae* for second generation bioethanol production

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The cost effective and sustainable production of second generation bioethanol, which made from lignocellulosic materials, must resolve two problems: Co-fermenting xylose with glucose and enhancing strain tolerance to lignocellulosic inhibitors. In our recent work, a robust diploid *Saccharomyces cerevisiae* strain BSIF was used as chassis cell. The novel *Ru-xylA* gene (US 8586336 B2) that expressed high xylose isomerase activity in *S. cerevisiae* and the *MGT05196(N360F)* gene (CN 104263739A) encoding a transporter that specifically transported xylose without any glucose inhibition were introduced into strain BSIF as well as overexpressed endogenous *XKS1* and genes of pentose phosphate pathway, etc. These rationally designed genetic modifications combined with alternant evolution in xylose and leach liquor of pretreated corn stover (PCS) endowed excellent xylose fermentation and inhibitor resistant capacity to the final resulting strain LF1 (CN 105199976A). The ethanol yield and specific xylose consumption rate of LF1 were 0.447 g g-1 and 1.073 g g-1 h-1 in fermentation of 40 g L-1 xylose and were 0.474 g g-1 and 1.751 g g-1 h-1 in fermentation with mixed sugar (80 g L-1 glucose and 40 g L-1 xylose). In the fermentation of PCS hydrolysate, LF1 consumed 77 g L-1 glucose and 36 g L-1 xylose in 40 hours with an ethanol yield of 0.411 g g-1, highlighting its potential use in second-generation bioethanol production. More genetic and evolutionary measures are being taken to make strain LF1 more suitable to producing second-generation bioethanol from various lignocellulosic hydrolysates.

Biography

Xiaoming Bao is a Professor and Doctoral Supervisor in State Key Laboratory of Microbial Technology, Shandong University. She is also a Committee Member of Chinese Society for Microbiology and Committee on Universal Education. Her major scientific interests are in the field of Metabolic Engineering, Molecular Biology and Yeast Physiology. She has undertaken more than 40 national and provincial projects and cooperated with several famous companies such as Novozymes, DSM, Chemtex, etc. She has 100 papers published in influential journals, including *Metabolic Engineering, Bioresource Technology and FEMS Yeast Research,* etc.

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