



清华工业生物催化论坛

TSINGHUA FORUM ON INDUSTRIAL
BIOCATALYSIS

Teaching an Old Dog New Tricks — Elucidating Core Design Principles to Engineer Nonconventional Yeasts as Novel Microbial Factories

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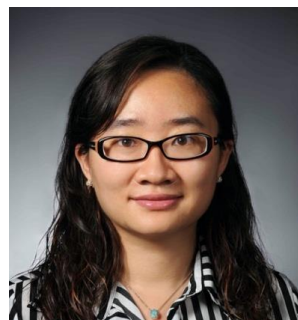
报告摘要:

Saccharomyces cerevisiae is far from being the only yeast of potential scientific and economic importance. Many of the 2000 other known yeast species have highly unusual metabolic, biosynthetic, and physiological capacities. However, significant hurdles lay in front due to the missing radical technologies to effectively engineer nonconventional microorganisms. Our research is geared towards illustrating how to design systematic rules and enable generalizable technologies that can be effectively applied from one species to another.

This presentation will focus on three examples. We integrated an *in silico* chromosome scanning with a high throughput screening to efficiently identify centromeric DNA that significantly stabilizes episomal expression. We also found that a previously overlooked region between the centromeric DNA and the autonomously replicating sequence plays a critical role in plasmid stable segregation during cell division. Lastly, when plasmids with high stability are not readily available, which is the case for the majority of the nonconventional microbial species, genome integration becomes the alternative choice. We leveraged the cut-and-paste feature of the DNA transposon to randomly insert the heterologous pathway into genomic regions with distinct transcriptional environments and efficiently identified top-performing variants. The development of these radical technologies contributes to the completion of the toolkit development, pushing the frontier of the metabolic engineering field to explore novel species and accelerate strain engineering for interesting products.

报告人简介:

Zengyi Shao received her B.S. in Biochemistry from Nankai University in 2002 and her Ph.D. in Chemical Engineering from the University of Illinois in 2009. She is now an associate professor in the Department of Chemical and Biological Engineering at Iowa State University and the Center for Biorenewable Chemicals. The long-term goal of Shao group is to elucidate the “functional genomics” of high-performing microbial species that exhibit unique biochemical, metabolic, and physiological features; a number of them do not have readily usable genetic manipulation tools and available genotype-phenotype correlation. Her research group strives to develop platform technologies to provide generic strain-engineering solutions, enable rapid design of high-performance microbes, and expand the current collection of microbial factories. She is the awardee of the 2010 National Academies Keck Futures Initiative Award, the 2016 Iowa Energy Center Impact Award, and the 2018 NSF CAREER Award.



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