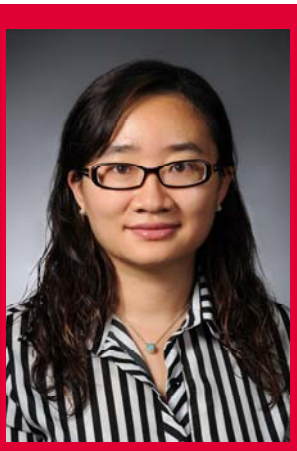
IOWA STATE UNIVERSITY
Department of Chemical and Biological Engineering

Graduate Seminar Series 2017-18



Zengyi Shao

**Assistant Professor,
Jack R. and Carol A. Johnson
Faculty Fellow**

Department of Chemical and Biological Engineering

**Iowa State University
Ames, IA**

Thursday,

January 18, 2018

11:00 a.m.

171 Durham Center

Iowa State University

Exploring Conventional and Nonconventional Yeasts to Produce Polymer, Pharmaceutical and Cosmetics Precursors

The advent of synthetic biology has revolutionized our ability to understand molecular mechanisms in complex biological processes, re-program genetic coding, and create novel functions. The long-term goal of our group is to elucidate the 'functional genomics' of high-performing microbial species that have unique biochemical, metabolic, and physiological features. We strive for developing platform technologies to provide generalizable strain-engineering solutions, enabling rapid, functional modifications of high-performance microbes, and expanding the current collection of microbial factories.

One theme of this seminar will focus on our recent progress on building yeast platforms to produce shikimate pathway-derived bioplastic, nutraceutical, and pharmaceutical precursors. Shikimate pathway serves an essential metabolic role in all living organisms and many bioactive alkaloid and flavonoid types of secondary metabolites are derived from here. In addition to the ability to express membrane-bound cytochrome P450 enzymes, yeast is generally recognized as safe (GRAS) for producing compounds used as nutraceutical and pharmaceutical ingredients. However, the intrinsically complicated genetic and metabolic regulations involved in yeast central carbon metabolism prohibit the production of high-value compounds derived from this treasure at levels of commercial interest. In the past few years, our group has deciphered the bottlenecks of shikimate biosynthesis in yeasts and achieved the highest production among all the compounds derived from this pathway using yeast platforms. The seminar will also concentrate on elucidating core design principles to enable rapid genetic engineering of nonconventional species. The model yeast *Saccharomyces cerevisiae* is far from being the only yeast of potential scientific and economic importance. Many of the 1800 other known yeast species have highly unusual biosynthetic, physiological, and fermentative capacities. Our research targets primary technology gaps in engineering nonconventional microorganisms and is geared towards enabling generalizable technologies that can be effectively applied from one species to another.

Zengyi Shao received her Ph.D. in Chemical Engineering from the University of Illinois in 2009 and B. S. in Biochemistry from Nankai University in 2002. She joined Iowa State University and the Center for Biorenewable Chemicals as an assistant professor in 2013 and is now Jack R. and Carol A. Johnson Faculty Fellow. Her research group mainly focuses on designing various microbes and their consortia to address critical issues in energy sustainability, chemical production and natural product synthesis. She is the awardee of the 2010 National Academies Keck Futures Initiative Award and the 2016 Iowa Energy Center Impact Award.

The Graduate Seminar Series events are part of the required curriculum for chemical engineering graduate students, but open to all Iowa State University graduate students, post-doctoral researchers, scientists, faculty and staff. See the full seminar schedule at cbe.iastate.edu/seminar-series/