

October 28-30, 2013 Kansas City Marriott Country Club Plaza, USA

## Embrace OMICS approaches for robust biocatalyst development

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One of the key barriers for economic biofuel production is the development and deployment of robust biocatalysts with high productivities and yields. Rapid technology progress in omics and next-generation sequencing (NGS) changes the paradigm and strategies for biocatalyst development making the understanding of the biocatalysts at a global level feasible. Using *Zymomonas mobilis* as a model system, the talk will discuss efforts to better understand biomass pretreatment hydrolysate inhibitor tolerance mechanisms using omics approaches, and insights we have obtained from these studies. Specifically, transposon-based mutagenesis approach was applied to select mutants with enhanced tolerance to pretreated corn stover hydrolysate. NGS-based genome resequencing was further applied to investigate the genetic differences among strains developed through mutagenesis and lab-directed adaptive evolution. We also use transcriptomics of chip-based high-density microarray and NGS-based strand specific RNA-Seq (ssRNA-Seq) to study the stress responses of *Z. mobilis* to the major inhibitors of furfural and acetate. Additionally, we will discuss the technical challenges we experienced when applying these NGS-based techniques for biocatalyst development and potential solutions to address them.

## Biography

Shihui Yang is a Scientist in the National Bioenergy Center at the National Renewable Energy Laboratory after finishing the postdoctoral study from the Biosciences Division and BioEnergy Science Center at the Oak Ridge National Laboratory. He received his Ph.D. degree from University of California, Riverside in 2005. His current research is focusing on pretreatment hydrolysate inhibitor tolerance mechanism and obstacles to nonnative substrate utilization to develop robust biocatalysts for economic advanced biofuel production using metabolic engineering, next-generation sequencing, and systems biology approaches. He has four patents and has published 20 papers in reputed journals such as *Nature Biotechnology* and *PNAS*.

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