Bio:

Qiang Yan was raised in northeastern China where he developed his interests in exploring nature and sports. Qiang received his bachelor's degree in Biological Engineering from Dalian Polytechnic University in 2007. During his undergraduate career, Qiang interned at a local brewery company as a fermentation engineer. After graduation, Qiang enrolled in the M.S. program at Jiangnan University. There he worked in the laboratory of Prof. Pu Zheng. Qiang's thesis research focused on optimizing bioreactor fermentation conditions to improve succinic acid production. His thesis was awarded "Excellent Master Dissertation Award of Jiangsu Province". Qiang was always curious about how tiny microorganisms can produce significant amount of chemicals and materials, which drove Qiang to pursue a Ph.D. degree to study microorganisms using engineering principles. Qiang enrolled in the Ph.D. program at Virginia Commonwealth University. There, Qiang joined Prof. Stephen S Fong's Systems Biology Laboratory. He learned techniques in systems biology, synthetic biology, and biomolecular engineering. His dissertation focused on metabolic engineering of a chitinolytic bacteria *Serratia marcescens*, to convert chitin into chemicals. He developed genetic tools, constructed genome-scale metabolic models, and used these tools to study biological functions, improve chemical production and understand metabolic perturbations. His dissertation was awarded "Virginia Commonwealth University Dissertation Award Fellowship". After graduating, he accepted a postdoctoral fellowship from the DOE Center for Advanced Bioenergy and Bioproducts Innovation to work in the laboratory of Prof. Brian F Pfleger at University of Wisconsin-Madison. There, Qiang learned how to use high-throughput techniques to engineer enzymes to produce novel oleochemicals which are difficult to be produced through petrochemicals and agricultural sources. Qiang also learned how to work with non-conventional yeast *Yarrowia*

lipolytica to rewire its metabolism to synthesize acetylated triacylglyceride. Outside of work, Qiang enjoyed spending time with his three-year old daughter on outdoor activities, such as fishing, soccer, hiking, and badminton.

Title: Engineering microbial cell factories for Biobased chemical production

Synthetic biologists are uniquely positioned to convert low value feedstocks into products which are difficult to obtain through conventional petrochemical or agricultural sources. Here, I will present our efforts on engineering microbial cell factories to produce value-added chemicals from renewable carbon sources. Often, our ability to design such complex biological systems are limited due to lack of knowledge and tools to understand biological functions. With the assist of multidisciplinary areas such as systems biology, synthetic biology and protein engineering, our efforts to metabolically engineer cells are boosted.

The first part of this talk focuses on how a chitinolytic bacteria, *Serratia marcescens*, was engineered to convert chitin, a major component in the seafood shell waste, to chemicals. I will discuss how the development of synthetic biology tools enabled us to study the biological functions of ChiR, a chitinase regulatory protein, and improve the production of acetyl-neuraminic acid. The second part explores how we leverage high-throughput biological screens to engineer highly active biocatalysts. I will showcase our efforts on engineering two key enzymes used for production of food additives and drop-in diesels: β-ketoacyl-CoA thioeterases and 3-hydroxyacyl-ACP:CoA transferase. The third part corroborates how combinatorial metabolic engineering strategies in *Yarrowia lipolytica* led to high-level production of acetylated triacylglyceride molecules. This study also revealed how the presence of lipid body significantly influences titers by sequestrating products to alleviate product toxicity. Finally, I will conclude

with a commentary on the remaining challenges in the field and where further research investments could prove fruitful.