Energy, Environmental & Chemical Engineering

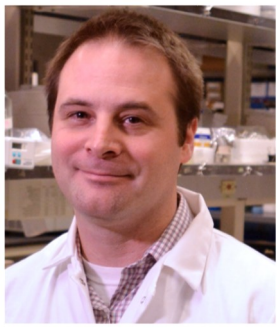
EECE Department Seminar

Friday, October 19, 2018
11:00am
Brauer Hall, Room 12

Exploiting native high flux metabolic pathways for chemical biosynthesis

ABSTRACT

A valuable approach to synthetic biology is identifying desirable phenotypes in microorganisms and developing genome and protein engineering tools to understand, control, and enhance these traits. The widespread adoption of type II CRISPR-Cas9 systems for genome editing has accelerated this approach by making less genetically tractable organisms more accessible. Toward this end, we have designed new synthetic RNA polymerase III promoters for guide RNA expression that enables efficient CRISPR-Cas9 genome editing in non-conventional yeasts. New genome editing tools, including genome-wide disruption libraries, standardized genome integration sites, and CRISPR-activation/interference systems for controlled gene regulation have allowed us to rapidly engineer and study the metabolisms of the yeast *Kluyveromyces marxianus* and *Yarrowia lipolytica*. We targeted thermotolerant *K. marxianus* because it has a natural capacity to uptake and convert a wide range of C5, C6, and C12 carbon sources into ester-based flavor and fragrance compounds at high rates. The oleaginous yeast *Y. lipolytica* is a valuable host for the synthesis of lipid-based compounds because it can effectively convert low cost carbon sources into triacylglycerides and other lipids. In this seminar, we describe the development of genome engineering tools for non-conventional yeasts and their application in understanding high flux ester biosynthesis in *K. marxianus* and oleochemical production in *Y. lipolytica*.



Ian Wheeldon, PhD

Associate Professor of Chemical & Environmental Engineering
University of California Riverside

Dr. Wheeldon is an Associate Professor of Chemical and Environmental Engineering and the Director of the Center for Industrial Biotechnology at the University of California, Riverside. He received his PhD in Chemical Engineering from Columbia University in 2009, and completed two years of postdoctoral training at Harvard Medical School and the Wyss Institute for Biologically Inspired Engineering at Harvard University. Dr. Wheeldon received a Master's of Applied Science from the Royal Military College of Canada (2003), and a Bachelor's of Applied Science (1999) from Queen's University, Canada. His research is focused on synthetic biology for chemical synthesis.

For more information contact Patty Kofron at pkofron@wustl.edu