

^{13}C -metabolism Analysis of Microbial Cell Factories: a Touch of Revelation



Yinjie Tang

Francis Ahmann Career Development
Associate Professor
Washington University in St. Louis

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[Physics Astronomy Building \(PAA\)](#) A110

Reception at 3:30 p.m. PAA A110

Abstract

Microbial cell factories can convert renewable carbon sources into biofuels and fine chemicals. To understand and improve microbial cell factories, ^{13}C -metabolic flux analysis (^{13}C -MFA) is an important tool that can reveal: 1) carbon and energy (i.e., ATP, NADH and NADPH) fluxes through a complex metabolic network; 2) rate-limiting factors controlling cell performance; 3) novel pathways in non-model microbes. More importantly, carbon and energy metabolisms are two contrary and interdependent forces in microbial workhorses. Hijacking carbon flux towards products unavoidably increases ATP maintenance loss, while the metabolic burden can limit product yields and increase genetic instability. As the only tool for quantifying cell energy metabolism, ^{13}C -MFA can accurately characterize microbial workhorses, avoiding false starts and dead ends during metabolic engineering. In this presentation, I will introduce our recent development of metabolism analysis tools (e.g., ^{13}C -MFA software and “isotopic-fingerprinting” approaches) as well as their applications to investigate carbon and energy metabolisms in biofuel producing microbes. I will also discuss metabolic flux analysis and the metabolic engineering of cyanobacteria as phototrophic chassis for synthesizing commodity chemicals (isobutanol and D-lactate).

Speaker Biography

I did my BS and MS in biochemical engineering at Tianjin University in China. I did my PhD in Chemical Engineering at University of Washington (with Dr. Barbara Krieger-Brockett). During my postdoctoral period, I worked on DOE projects in Lawrence Berkeley National Laboratory (with Dr. Jay Keasling). I became an assistant professor at Washington University in 2008. Currently, my research focuses on characterizing environmental microorganisms and engineering *E.coli* / cyanobacteria for chemical productions.