



# Department of Civil & Environmental Engineering & Earth Science

## EE/ES Series

January 22, 2018  
217 DeBartolo Hall 3:30 p.m.-4:30 p.m.  
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### Title:

### **<sup>13</sup>C-Metabolic Flux Analysis of Environmental Microorganisms**

### Abstract:

Metabolic flux analysis via <sup>13</sup>C labeling is a powerful tool to quantitatively track metabolic pathways and determine overall enzyme functions in cells. Measuring metabolic fluxes allows us to observe the functional output of microbial metabolisms and bridges contemporary omics analyses to the cellular phenotype. Two core techniques are necessary for <sup>13</sup>C-metabolic flux analysis: 1) precise measurements of the labeling pattern of targeted metabolites and 2) interpretation of large data sets given by mass spectrometry measurements with a computer model to calculate the metabolic fluxes catalyzed by cellular enzymes. <sup>13</sup>C-metabolic flux analysis has diverse applications for studying novel environmental microorganisms which are important for bioremediation or bio-fuel production. In this presentation, I will discuss three fluxomic studies in my lab: 1) investigate lignin relevant metabolism in *Sphingobium* sp. strain SYK-6; 2) use isotopically nonstationary <sup>13</sup>C labeling experiments for flux analysis of photoautotrophic cyanobacterium *Synechococcus* 2973; 3) reveal functional pathways in *Clostridium* during syngas fermentations. In summary, <sup>13</sup>C-metabolic flux analysis can not only help us understand cell physiologies, but also offer evaluation of microbial workhorses and their pathway bottlenecks under bioprocess manufacturing conditions.

### BIO:

Yinjie Tang, Ph.D. in the Department of Energy, Environmental and Chemical Engineering at Washington University has expertise in environmental microbiology, kinetic modeling, and metabolic flux analysis. He did his PhD in Chemical Engineering at the University of Washington (with Dr. Barbara Krieger-Brockett). He worked on DOE GTL projects during his postdoctoral period (2004~2008) in Lawrence Berkeley National Laboratory (with Dr. Jay Keasling). He moved to Washington University in 2008, where his research focuses on characterizing and engineering nonmodel microorganisms for bio-manufacturing.