

MicroTAS 2021 Workshop 8 Information

WORKSHOP TITLE: Microfluidics for Microbiota Analysis

PRESENTER AFFILIATION:

[James Boedicker](#), University of Southern California, USA - Bacterial Networks for Synthetic Biology, Gene Regulation, Decision Making & Computation

[Hyun Jung Kim](#), University of Texas, Austin, USA - Organ-on-a-Chip, Gut-on-a-Chip, Host-microbiome Ecosystem

WORKSHOP DESCRIPTION:

This workshop will introduce current methods for characterizing and modeling microbial community interaction networks, as well as overviewing organ-on-chip and gut-on-chip type microbiome systems.

Bacterial networks for synthetic biology, gene regulation, decision making & computation,

OVERVIEW OF MATERIAL TO BE COVERED AND WHAT ATTENDEES CAN EXPECT TO TAKE AWAY FROM THE WORKSHOP:

(i) Bacterial Networks for Synthetic Biology, Gene Regulation and Decision Making (James Boedicker): I will discuss methods to quantify cell growth and activity within diverse microbial communities. These methods will include high throughput measurements that utilize microfluidic technologies, as well as the implementation of microfluidic approaches to analyze the influence of spatial structure on cell interaction networks. Next, I will discuss how such measurements enable the construction of models to predict the dynamics of microbial communities. Several methods will be compared, highlighting advantages and disadvantages of each approach. I will discuss experimental strategies to quantify cell-cell interactions within bacterial communities and analytical approaches to extract parameters that account for interactions between species. The workshop will discuss and compare current approaches to build predictive models of activity and growth of microbial consortia.

(ii) Organ-on-a-Chip, Gut-on-a-Chip, Host-microbiome Ecosystem (Hyun Jung Kim): I will discuss experimental overviews to recreate a three-dimensional epithelial layer in a microfluidic gut-on-a-chip that exerts physical movement and fluid shear to mimic the physiological intestinal microenvironment. In this microengineered model, an advanced strategy to co-culture living microbial cells will be discussed by generating an anoxic-oxic interface (AOI) and steady-state chemical & physical dynamics in a gut-on-a-chip.

WHO SHOULD ATTEND:

How do cell-cell interactions dictate the activity and growth of microbial communities? This is a difficult question that requires advances in both experimental tools and modeling approaches. This workshop is for researchers interested in designing new experimental system to measure microbial interactions and/or utilizing experimental data to build models of bacterial interaction networks. Students and researchers interested in an advanced in vitro co-culture platform demonstrate host-microbiome crosstalk germane to the initiation of gastrointestinal diseases.

PARTICIPANTS WILL NEED THE FOLLOWING:

For those attending in-person, a laptop or iPad with headphones are required.