MicroTAS 2021 Workshop 11 Information

WORKSHOP TITLE: Sensor Integration for Microsystems

PRESENTER AFFILIATION:

1. Ashley E. Ross, University of Cincinnati (https://www.rosslabuc.com/)

Topic “Sensor Integration for Analysis of Tissue Slices”

2. Katsuo Kurabayashi, University of Michigan (http://katsuokurabayashi.com/)

Topic: Point-of-Care Integrated Plasmonic Biosensor Microsystems

3. Kosuke Ino, Tohoku University
(https://www.che.tohoku.ac.jp/~est/member_English.html)

Topic: Electrochemical sensing of cell secretions in microsystems

WORKSHOP DESCRIPTION:

Microsystems integrated with sensors for reliable, reproducible, and versatile assay platforms will be described, including integrated plasmonic biosensors, electrochemical of cell secretions and analysis of tissue slices with microfluidic stimulation.

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

(i) Sensor Integration for Analysis of Tissue Slices (Ashley Ross): TStrategies and approaches for integrating electrochemical sensor technology into microsystems to stimulate and analyze cellular communication in tissue slices will be presented. We will specifically cover the major challenges in making electrochemical measurements in tissue slices on-chip, special considerations needed when integrating electrochemical sensors on-chip for tissue analysis, and approaches to locally stimulate cellular responses in tissue.

(ii) Point-of-Care Integrated Plasmonic Biosensor Microsystems (Katsuo Kurabayashi): Point-of-care testing (POCT) that enables medical/clinical analysis at or near the location of patient care has shown a great potential for precise and personalized health care, providing fast, cost-effective, and easy-to-use diagnostic testing that shortens the therapeutic turnaround time. Potential global market growth for POTC is estimated to be from US$23.16 billion in 2016 to US$36.96 billion in 2021. Nanoplasmonic biosensors have emerged as a promising platform for POC measurements. These sensors are

label-free and capable of detecting the surface binding of analyte biomolecules in real-time. The sensor signal is derived from a shift in photon absorbing and scattering behaviors of collectively oscillating conduction-band electrons, which are highly localized on the surfaces of metallic nanostructures. Nanoplasmonic biosensors are robust, rapid, and cost-effective, making it easy to integrate them into miniaturized fluidic devices with simple optics. This workshop targets audiences interested in learning the principles, sensor integrations, and recent applications of nanoplasmonic biosensors in the field of medical diagnostics.

(iii) Electrochemical sensing of cell secretions in microsystems (Kosuke Ino): Recently, micro/nanometer-sized electrodes are easily fabricated, owning to the micro/nanofabrication techniques. Devices with micro/nanoelectrodes are attracting attention for cell analysis, because of its unique features, such as high signal-to-noise ratio and electrochemical detection in local areas. This aim of the workshop is to introduce cell analysis using the micro/nanosystems focusing on electrochemistry.

WHO SHOULD ATTEND:

Early career researchers in microfluidics interested in electrochemical and plasmonic sensing in tissue and cell culture systems and representatives from the industry interested in emerging tools will especially benefit from this workshop.

PARTICIPANTS WILL NEED:

Computer/Laptop

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