

PLANT PATHOLOGY 250 SEMINAR SERIES**Thursday, February 22, 2024****12:00 p.m. – 12:50 p.m.**

Hideaki Tsutsui, Associate Professor, Department of Mechanical Engineering, UC Riverside

Seminar Title: "Portable bio-detection and sample preparation devices using paper"

Abstract: In-field pathogen detection and disease diagnosis enables rapid and effective first response in many scenarios, such as infectious disease outbreaks, farming, environmental monitoring, space travel, and biological warfare. This talk will introduce my research group's efforts toward developing portable sample-to-answer bio-detection devices. First, I will discuss a series of paper-based microfluidic biosensors. Paper and similar porous materials have properties and characteristics such as spontaneous liquid imbibition, low cost, lightweight, and ease of fabrication, making them one of the ideal substrates for developing portable biosensors. For example, we developed paper-based microfluidic protein sensors featuring carbon nanotube transducers and a patterned fluidic network for label-free detection of multiple protein analytes in simulated body fluids. Second, I will discuss our recent efforts on a portable sample preparation system, particularly for extracting pathogens' nucleic acids from plant tissues. Plant tissues have cell walls and other robust structures, unlike clinical samples such as blood, urine, saliva, and some tissue specimens. Because of this, plant samples usually require mechanical and chemical lysis to extract pathogen nucleic acids. We combined a micro-homogenizer and a paper disk to successfully extract and purify pathogen nucleic acids for detection using quantitative polymerase chain reaction (qPCR) and loop-mediated isothermal amplification (LAMP). I will conclude my talk by highlighting our ongoing efforts to integrate these critical functions into a single device.

Biography: Hideaki Tsutsui is an Associate Professor of the Department of Mechanical Engineering at the University of California, Riverside. He is also a participating faculty member of the Department of Bioengineering and the UCR Stem Cell Center. He received a B.E. from the University of Tokyo (2001), a M.S. from the University of California, San Diego (2003), and a Ph.D. from the University of California, Los Angeles (2009), all in Mechanical Engineering. He conducted postdoctoral research from 2009 to 2011 at the Center for Cell Control and the Mechanical and Aerospace Engineering Department at UCLA. His current research interests include low-cost medical and agricultural biosensors and macro- and micro-fluidic tools for cell-based biomanufacturing. He is a recipient of a Grand Challenges Explorations Phase I Award from the Bill & Melinda Gates Foundation (2012) and a Faculty Early Career Development Program (CAREER) Award from the National Science Foundation (2017). He was named the 2018 Class of Influential Researchers by *ACS Industrial & Engineering Chemistry Research*. He serves on the editorial board of *SLAS Technology*.

Location: Genomics Auditorium 1102A**Seminar Host: Dr. Georgios Vidalakis**