

# The 55<sup>th</sup> JUACEP Seminar

第55回 名古屋大学日米加協働教育プログラムセミナー

11:15-12:30, Wednesday 9 August 2023

TEL Auditorium, 3F, EI Bldg.

## Integrated Plasmonic Biosensors: from Critical Care Medicine to Airborne Virus Monitoring

**Prof. Katsuo Kurabayashi**

Department of Mechanical and Aerospace Engineering  
Tandon School of Engineering  
New York University, Brooklyn, NY 11201, USA



**Abstract** Biosensors are devices that combines biological elements with a mechanism to recognize proteins, DNA molecules, or enzymes and produce output optical and electrical signals. Nanoparticle-based biosensors are a type of technology that can detect analyse substances in our body without the need for any labels or additional chemicals. These biosensors are durable, fast, cost-effective, and can easily be integrated into small systems that handle fluids. These biosensors are seen as promising tools for testing diseases right at the point of care, meaning that they can be used in clinics or even at home to quickly diagnose illnesses. However, while they have many advantages, some of these sensors still have limitations when it comes to being both fast and sensitive enough to diagnose critical and life-threatening conditions caused by severe infections, trauma, surgery, or side effects of immunotherapy.

In this talk, the speaker will discuss recent advancements made by his research group and collaborators in developing small biosensors that can perform highly efficient and accurate tests for protein biomarkers. These biosensors are designed to work on a small chip and use a unique atomically thin semiconducting photodetector to detect biomarkers. The speaker's research group has used these biosensors to monitor the levels of sepsis biomarkers and airborne COVID-19 virus particles for critical care medicine and environmental safety.

At the beginning, this talk will briefly introduce the graduate program, international collaborations, and research activities at the New York University Mechanical and Aerospace Engineering Department to the JUACEP student audiences.

**Biography** Katsuo Kurabayashi is a Professor and Chair of Mechanical and Aerospace Engineering at New York University (NYU). Prior to his appointment at NYU, he was a Professor of Mechanical and Electrical Engineering and Computer Science at the University of Michigan, Ann Arbor. He received a B.S. in Precision Engineering from the University of Tokyo, Japan, in 1992, and a M.S. and Ph.D. in Materials Science and Engineering from Stanford University, CA, in 1994 and 1998, respectively. His current research focuses on microfluidic digital immunoassays, optofluidics, nanoplasmonic and biomolecular biosensing, and BioMEMS/microsystems for clinical diagnosis, single-cell study, and analytical chemistry. He has authored and co-authored 180 peer-reviewed papers and holds 11 U.S. patents. He received a 2001 NSF Early Faculty Career Development (CAREER) Award, and the Robert Caddell Memorial Award in 2005, the Pi Tau Sigma Outstanding Professor Award in 2007, the University of Michigan Mechanical Engineering Outstanding Achievement Award in 2013, the Ted Kennedy Award in 2015, and the Wise-Najafi Prize for Engineering Excellence in the Miniature World in 2019 from the College of Engineering at the University of Michigan. He is also a Fellow of the Royal Society of Chemistry (RSC) and the American Society of Mechanical Engineering (ASME).

**Inquiry: JUACEP Office** 日米加協働教育プログラム (Ext. 2799)

JUACEP: Japan-US-Canada Advanced Collaborative Education Program, Graduate School of Engineering