The 31st JUACEP Seminar

第 31 回 名古屋大学日米協働教育プログラムセミナー

"Multi-Scale Integration of Soft Polymers and Biomolecules for Hybrid Microsystems Technology"

Lecturer: Professor Katsuo Kurabayashi

Department of Mechanical Engineering
and Electrical Engineering & Computer Science,
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BIOGRAPHY:

Dr. Kurabayashi received his Bachelor's degree in Precision Engineering at the University of Tokyo in 1992 and his M.S. and Ph.D. degrees in Materials Science and Engineering from Stanford University (specialized in devices and materials), in 1994 and 1998, respectively. He is currently Professor and Associate Department Chair of Mechanical Engineering. His group at Michigan studies RF MEMS reliability physics, biomolecular motor hybrid NEMS/MEMS technology, polymer-on-silicon MEMS photonics, micro gas chromatography (μGC), protein/cell patterning for bioelectronics and biosensors, funded by NSF, NIH, NASA, CIA, DARPA, and industries. He authored and co-authored more than 110 journal and conference papers, two of which received a best paper award (Semiconductor Research Corporation Best Paper Award in 1998, and International VLSI Multilevel Interconnection Conference Outstanding Paper Award in 1998). He is a recipient of the 2001 National Science Foundation (NSF) Early Faculty Career Development (CAREER) Award, the University of Michigan Robert Caddell Memorial Award (2004), Pi Tau Sigma Outstanding Professor Award (2007), and University of Michigan College of Engineering Ted Kennedy Family Team Excellence Award (2015). Dr. Kurabayashi holds 5 U.S. patents.

Date: July 15, 2015 (Wed) 13:30-15:00
Venue: VBL Hall (3rd floor, VBL Building)
***No registration required**

ABSTRACT

This talk presents our studies aiming at establishing a comprehensive microsystem for biological assay and biodetection. Our research develops technological foundations for protein concentration and spectral flow cytometric immunoassay in a microfluidic channel. Along with this technological development, we demonstrate (1) strain-tunable nanophotonic MEMS spectroscopy and (2) ATP-fueled biomolecular motor nanoscale mass transport. These tasks are performed by successfully integrating both biological and non-biological nano/microstructures into a single microfluidic or silicon MEMS device across multiple dimensional scales ranging from a few nanometers to several micro/millimeters. The loading of proteins and cells into a microfluidic structure is performed under post-device fabrication conditions, and the seamless integration of soft polymers onto a silicon MEMS structure is achieved at low temperature (<150 °C). These conditions enable us to construct biological and polymeric components within a MEMS structure compatible with CMOS processing and packaging. The demonstrated technologies provide the functions of assembling, manipulating, and analyzing biomaterials and analytes with great simplicity, flexibility, sensitivity, and unprecedented multiplexing capability at low power, low cost, and low volume.

Inquiry: JUACEP Office, Mech. Sci. Eng. (Ext. 2799)

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