

Department of Mechanical and Biomedical Engineering

Seminar Series

BioMEMS and Bioinstrumentation for Single Cell Analysis and Tissue Engineering Scaffolds

Dr. Chengzhi Hu

Postdoctoral Associate

Multi-Scale Robotics Lab, Switzerland

Date	January 10, 2018 (Wednesday)
Time	10:00am – 11:00am
Venue	B6605 (CSE Conference Room), 6/F, Lift 3 Yeung Kin Man Academic Building

Abstract

Biomedical microelectromechanical systems (BioMEMS) are miniaturized systems that are widely investigated in biological and medical sciences. Compared with conventional techniques, bioMEMS devices offer remarkable advantages in terms of high-throughput, low-cost, and quantitative bioanalysis. Over the past few years, Dr. Hu has been endeavoring to the development and use of bioMEMS devices that can be integrated with micro/nano- robots, and micro/nano- manipulation tools for single cell analysis and tissue engineering scaffolds. He has developed a novel soft indentation method for on-chip and high-throughput characterization of cellular biomechanical properties of tip-growing cells. Another multifunctional microelectrode device that can generate quantitative chemical cues has been proposed and implemented to investigate their effects on the polarized growth of pollen tube. These bioMEMS devices provide a versatile platform for studying plant cell expansion, morphogenesis, and mechanotransduction. As to the implementation on micro-robot system level, he has developed a double template-assisted electrodeposition method for fabricating porous magnetic microrobots. Drugs can be encapsulated inside pores and the release can be triggered by external

cues such as pH and temperature. To overcome the difficulties in controlling the pore density and interconnectivity during the fabrication of tissue engineering scaffolds, he has developed several types of magnetic porogen and magnetic assembly techniques, and engineered sheet-like and tunable scaffolds for regenerative medicine.

About the Speaker

Chengzhi Hu received the Ph.D degree in the Department of Micro-Nano Systems Engineering, Nagoya University in 2014. He received his Bachelor degree (2008) and Master degree (2010) from Huazhong University of Science and Technology, both majoring in mechanical science and engineering. Since May 2014, he joined Multi-Scale Robotics Lab at ETH Zurich, as a postdoctoral associate. His current research interests include the development of magnetic micro/nano tools, and the design and implementation of BioMEMS and microrobot for single cell analysis; active control of capsule endoscope; magnetically guided assembly of porogen and hydrogel microfibers for fabrication of tissue-engineering scaffolds. Till now, he has published 22 journal papers and 24 conference papers, including papers on *Lab on a Chip*, *Electrochemistry Communications*, *ACS Nano*, and other top journals. Moreover, he has filed 4 patents, has contributed in the writing of one book, has led three research projects, and has participated in two research projects. The funding sources include European Research Council, Swiss National Science Foundation and Japanese Ministry of Education, Culture, Sports, Science and Technology. He has received the award for Excellent Graduate Student of Nagoya University (top 5% of the University), Best Paper Award on MHS 2012, and won the champion in ICRA 2015 mobile microrobot assembly challenge. He is now the guest editor of *Journal of healthcare engineering* and *Journal of robotics*.

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All are Welcome!