

THE UNIVERSITY



OF HONG KONG

**DEPARTMENT OF MECHANICAL ENGINEERING
AND
MEDICAL ENGINEERING PROGRAMME**

SEMINAR

Title: 3D Heterogeneous Hydrogels Formation and Assembly on an Electromicrofluidic Platform

**Speaker: Professor Shih-Kang Fan
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Date: 10 July, 2017 (Monday)

Time: 11:00 a.m.

Venue: Room 7-37, Haking Wong Building, HKU

Abstract

Manipulations of prepolymer hydrogel droplets and cells are demonstrated on an electromicrofluidic platform to construct a complex and heterogeneous microenvironment for cell culture. 3D hydrogel building blocks with reorganized cells or particles are formed and assembled on the electromicrofluidic platform adopting electrowetting and dielectrophoresis. We demonstrate the manipulations of varied objects (a) in multiple phases such as prepolymer liquid hydrogel droplets and crosslinked hydrogels, (b) on a wide range of scales from micrometer cells or particles to millimeter assembled hydrogel architectures, and (c) with diverse properties such as conductive and dielectric prepolymer droplets that are photo, chemically, or thermally crosslinkable. 3D hydrogel architectures, composed of (i) varied particles or cells reorganized in programmable patterns and (ii) biomimetic hydrogels of designed properties and in adjustable geometries, are obtained. The electromicrofluidic platform is generic and alternative to manipulate cells and hydrogel for reconfigurable 3D architectures.

Reference:

1. M.-Y. Chiang, Y.-W. Hsu, H.-Y. Hsieh, S.-Y. Chen, S.-K. Fan*, "Constructing 3D heterogeneous hydrogels from electrically manipulated prepolymer droplets and crosslinked microgels," *Science Advances*, vol. 2, 2016, e1600964.
2. Shoji Takeuchi, "Materials science: Versatile gel assembly on a chip," *Nature*, vol. 541, 2017, 470-471.
3. *Science News* coverage, "Video: Creating artificial tissues just got easier, thanks to this Tetris-like building technique," <http://bit.ly/2eMuUcv>.



Shih-Kang Scott Fan is Professor of the Mechanical Engineering Department and Researcher of the Center for Biotechnology in National Taiwan University (NTU), Taiwan. He received his B.S. from National Central University, Taiwan in 1996 and the M.S. and Ph.D. degrees from University of California, Los Angeles (UCLA) in 2001 and 2003, respectively. In 2004, Dr. Fan started his career at National Chiao Tung University, Taiwan and rose to Associate Professor in the Institute of Nanotechnology and the Department of Material Sciences before he moved to NTU in 2012.

Dr. Fan is known for his contributions in electrowetting, electro-microfluidics, tissue engineering, and in vitro diagnosis. He is the recipient of several awards, including the "*Ta-You Wu Memorial Award*" from National Science Council (2011), the "*Research Award for Junior Research Investigators*" from Academia Sinica (2012), the "*Young Scholar's Creativity Award*" from Foundation for the Advancement of Outstanding Scholarship (2014), the "*TBF Chair in Biotechnology*" from Taiwan Bio-Development Foundation (2104), and "*Outstanding Research Award*" from Ministry of Science and Technology (2017). He was elected *Fellow* of Royal Society of Chemistry in 2016. He also served in professional societies and conferences. He was *General Chair* of the International Conference on Optofluidics and the International Meeting on Electrowetting.

ALL INTERESTED ARE WELCOME

For further information, please contact Dr. A. Shum at 3917 7904.

Research area: Biomedical Engineering