College of Science and Engineering

Department of Biomedical Sciences

Seminar

Microfluidic techniques for isolation and analysis of floating cells

Dr. Raymond Lam

Department of Biomedical Engineering, City University of Hong Kong

Control of tumor cell migration and screening in biomimetic platform

Prof. Stella Pang

Department of Electronic Engineering, City University of Hong Kong

Date: 25 July 2018 (Wednesday)

Time: 12:00 nn – 1:30 pm (Reception with light sandwiches at 11:45am, talks start at 12nn. To facilitate the order of sandwiches, please register through email chchung33@cityu.edu.hk.)

Venue: P4302, Yeung Kin Man Academic Building, City University of Hong Kong

Two Presentations of 30 min each, followed by a 30 min discussion on collaboration activities

1. Microfluidic techniques for isolation and analysis of floating cells

Isolation and analysis of floating cells has been technically challenging, including the cell positioning and characterization of the cells in the floating state. For example, isolation of floating rare cells, such as circulating tumor cells, has low abundance and limited time-frames of expressions of relevant cell characteristics. Deep phenotyping of single cancer cells for both the mechanical and biochemical properties is of critical importance in the era of precision medicine to advance understanding of relationships between gene mutation and cell phenotype and to elucidate the biological nature of tumor heterogeneity. On the other hand, Quantitative and dynamic analyses of immune cell secretory cytokines are essential for precise determination and characterization of the "immune phenotype" of patients for clinical diagnosis and treatment of immune-related diseases.

In this seminar, the speaker will present a couple microfluidic techniques for the floating cell analysis: 1) a hydrodynamic mechanism to sequentially trap and isolate floating cancer cells in biosamples through a series of microsieves to obtain up to 100% trapping yield and >95% sequential isolation efficiency, 2) a microfluidic elasticity microcytometer for multiparametric biomechanical and biochemical phenotypic profiling of free-floating, live single cancer cells for quantitative, simultaneous characterizations of cell size, cell deformability/ stiffness, and surface receptors, and 3) a microfluidic sensing chip integrated with cytometric fluorescent microbeads for real-time and multiplexed monitoring of immune cell cytokine secretion dynamics, consuming only a negligible sample volume without interrupting the immune cell culture. Furthermore, the speaker will briefly introduce an on-going research project on the single-bacterial cell isolation, collaborated with another CBNN member Dr. Patrick K. H. Lee.

Biography

Raymond H. W. Lam is currently working as an Associate Professor in the Department of Biomedical Engineering at City University of Hong Kong. He has obtained a first honor B.Eng. degree and an M.Phil. degree in Automation and Computer-Aided Engineering from Chinese University of Hong Kong, and a Ph.D. degree in Mechanical Engineering from Massachusetts Institute of Technology. Before joining CityU, he was a postdoctoral fellow in the Department of Mechanical Engineering at University of Michigan. He has interdisciplinary research experience in cell mechanobiology, bacteriology, microfluidics, microfabrication, computational methods, software development and circuit/device design. His overall research objective is to bridge science and engineering knowledge and currently he aims at developing/applying microengineering techniques to advance the cell biology research.

Seminar

2. Control of tumor cell migration and screening in biomimetic platform

Nanoimprint technology was used to generate three-dimensional (3D) platforms to mimic the extracellular matrix (ECM) topography, endothelia cells membrane, and blood vessels for nasopharyngeal carcinoma (NPC) cells. These multiple layer platforms consisted of 3D scaffold, guiding pattern, porous membrane, and trenches below. With reversal nanoimprint, complex 3D platforms were formed with the designed topography, materials, injection ports, and surface coating to control cell migration, interactions, and screening. Results on the control of cell migration, separation of cancer cells from normal cells, and cancer cell invasiveness will be presented.

Biography

Stella W. Pang is Chair Professor and Department Head in the department of Electronic Engineering at City University of Hong Kong. She is the director of Center for Biosystems, Neuroscience, and Nanotechnology. Previously, she was Professor of Electrical Engineering and Computer Science and Associate Dean at the University of Michigan. Prof. Pang's research interests include nanofabrication technology for microelectromechanical, biomedical, microelectronic, and optical devices. She has over 400 technical papers, book chapters, and invited presentations, editor and author of 16 books, journals, and conference proceedings, and held 9 patents in nanotechnology and microsystems. She is a Fellow of IEEE, ECS, and AVS.

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