

SynCTI SEMINAR SERIES

NUS Synthetic Biology for Clinical and Technological Innovation (NUS SynCTI)
Member of Singapore Consortium for Synthetic Biology (Sinergy)



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Engineering systemic organ interactions with microfluidics

Human physiology and pathophysiology, such as such as in metabolic diseases and microbiome-host interactions, often involve systemic interactions between multiple tissues. Multi-organ perfusion systems offer the unique opportunity to mimic different physiological systemic interactions. However, existing multi-organ culture platforms have limited flexibility in specifying the culture conditions, device architectures, and fluidic connectivity simultaneously. Modularization provides an attractive approach to overcome these limitations. To this end, my lab has developed a Tetris-Like (TILE) modular microfluidic platform, which enables a 'stick-n-play' approach to assemble planar perfusion circuits that are amenable to both bioimaging-based and analytical measurements. A myriad of tissue culture and flow control TILE modules were successfully constructed with backward compatibility. Finally, I will demonstrate applications in constructing recirculating multi-organ systems to emulate liver-mediated bioactivation of nutraceuticals and prodrugs to modulate their therapeutic efficacies in the context of atherosclerosis and cancer. This platform greatly facilitates the integration of existing organs-on-chip models to provide an intuitive and flexible way for users to configure different multi-organ perfusion systems.

*Yi-Chin Toh obtained her B.Eng in Chemical Engineering and Ph.D in Bioengineering from the National University of Singapore in 2001 and 2008 respectively. She did her post-doctoral training at the Massachusetts Institute of Technology in 2008 before joining the Institute of Bioengineering and Nanotechnology, A*STAR as a research scientist in 2010. Since 2014, she has been an Assistant Professor at the Department of Biomedical Engineering, National University of Singapore. Her research interest is in engineering micro-scale tissue models to mimic complex biological interactions during human development and diseases, and translating them into scalable platforms for disease modeling and drug testing applications. Dr Toh is a recipient of the National University of Singapore Research Scholarship, A*STAR Graduate Scholarship and A*STAR International Fellowship.*

Monday, 10th June 2019 at 2pm

CeLS Seminar Room 1 #01-06

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Hosted by: A/Prof Poh Chueh Loo

