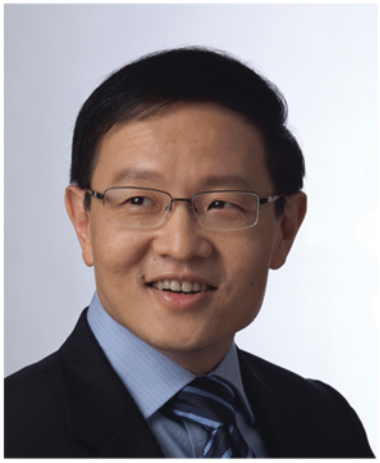

Chwee Teck LIM, Ph.D.

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IFMBE

IFMBE Zworykin Award 2015

Prof Chwee Teck Lim is a Provost's Chair Professor at the Department of Biomedical Engineering and also a Principal Investigator at the Mechanobiology Institute at the National University of Singapore. His research interests include mechanobiology of human diseases and the development of microfluidic biochips for disease detection and diagnosis. Prof Lim has authored more than 260 peer-reviewed papers (including 36 invited/review articles) and delivered more than 250 invited talks. He is currently on the editorial boards of 12 international journals. He has also co-founded four startups and an incubator that commercialize the technologies developed in his lab. Prof Lim and his team have won more than 40 research awards and honors including the university's Outstanding Researcher Award, Outstanding Innovator Award and TiE50 Award (Silicon Valley) in 2014, Credit Suisse Technopreneur of the Year Award, Wall Street Journal Asian Innovation Award (Gold), TechVenture Most Disruptive Innovation Award, Asian Entrepreneurship Award (First Prize) in 2012, President's Technology Award and the TechVenture Rising Star Innovator Award in 2011 and the IES Prestigious Engineering Achievement Award in 2010.

Microfluidic Technologies for Disease Diagnosis, Therapeutics & Personalized Medicine

Our blood comprises ~5 billion cells in one cubic milimeter with red blood cells (RBCs) accounting for >99% of all cellular components suspended in protein-rich plasma. Besides blood constituents, pathogenic microorganisms or diseased cells can also be present in blood for certain diseases, which can present possible routes for disease detection, diagnosis and therapy. However, the presence of the large number of RBCs complicates removal of pathogens in blood as well as makes disease diagnosis such as detection of rare circulating tumour cells (CTCs) in blood of cancer patients extremely challenging. Here, we address these issues and demonstrate that physical biomarkers such as the unique size and deformability of diseased cells can be effectively used for their detection and separation from blood by using microfluidics. We do this by leveraging on the many inherent advantages of microfluidics such as high sensitivity and spatial resolution, short processing time and low device cost. We developed a suite of microfluidic biochips that exploit the principles of cell size/deformability based separation as well as inertial focusing to perform high throughput continuous detection and separation of diseased cells. These simple, efficient and cost effective microfluidic platforms will be imperative in realizing point-of-care (POC) diagnostics and invaluable for many downstream clinical and biological applications as well as personalized treatment.