Institute of Medical Biology
A*STAR

Seminar Announcement

- All Are Welcome -



Speaker: **Prof Luke Lee**

Arnold and Barbara Silverman Distinguished Professor
Departments of Bioengineering, Electrical Engineering & Computer Science, and Biophysics Program
Berkeley Sensor and Actuator Center, California Institute of Quantitative Biosciences, UC Berkeley

Title : "Quantum Biology and Its Medical Applications"

Date : 1 Mar 2016 (Tuesday)
Time : 4.30pm – 5.30pm
Venue : Breakthrough Theatrette, Matrix Level 4, Biopolis
Host : Prof Birgit Lane
(Tel: 64070151, e-mail: birgit.lane@imb.a-star.edu.sg)

Abstract of the Seminar:

In this seminar, Professor Lee will present quantum bionanophotonics for fundamental life sciences and precision medicine. He will introduce *quantum nanosc*ope that allow non-invasive optical imaging of electron-transfer (ET) dynamics in live cells. The quantum nanoscope is designed to capture the real-time ET imaging of enzymes using *Plasmon Resonance Energy Transfer (PRET)* mechanism and quantized plasmon quenching dips in resonant Rayleigh scattering spectra. Secondly, he will discuss *photonic gene circuits* for noninvasive gene regulations in living organism and gene therapy. Since the activation of transcription factor NF-κB plays a central role in the regulation of inflammation, immune responses, infections, differentiation, proliferation, oncogenesis, and cell death, our precise spatiotemporal controls of NF-κB signaling pathway by optically addressable siRNA-antennas will have significant implications in precision medicine. Thirdly, he will discuss the important role of *bionanophotonics* in integrated molecular diagnostic systems (iMDx) for personalized precision medicine, and microphysiological analysis platforms (iMAPs) for drug discovery and regenerative medicine. The iMDx comprises three key elements of *precision medicine on chip*: multiplexed ultrafast photonic PCR array for DNAs and RNAs, signal amplifications of protein assays, and a self-contained sample preparation from whole blood on chip, which allows a sample-to-answer readout platform. The progress on patient-specific iPSCs-based iMAPs, pancreatic islets and mini-brains on chip will be discussed along with the vision of preventive medicine via precision engineering in medicine.

About the Speaker:

Prof Luke P. Lee is Arnold and Barbara Silverman Distinguished Professor at UC Berkeley. He is also co-director of Berkeley Sensor & Actuator Center and director of Biomedical Institute of Global Healthcare Research and Technology (BIGHEART). He received both his BA and PhD from UC Berkeley. Prof. Lee has authored and co-authored numerous papers on biophotonics, nanoscale biophysics, single cell analysis, microfluidic quantitative cell biology, and integrated biomedical devices. His current research interests are the quantum biology of electron transfer dynamics in live cells, neurointerfaces, molecular diagnostics, *in vitro* neuropathogenesis, and solving healthcare challenges of both developed and developing countries.