Electrofluidics and Optofluidics: Bringing Moore’s Law to Biomedical Diagnostics and Life Sciences

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Abstract:

Whereas the complex computation problems have been efficiently tackled by the exponentially growing number of transistors integrated into a single chip, solving the incredible complexity of the living organisms (especially at the molecular level) still faces many challenges. As the driving forces for Moore’s law in microelectronics, micro- and nano-scale technologies also hold great promise for unraveling the mystery in life sciences and developing the next generation of high throughput biomedical diagnostic devices and systems.

In this talk, I will discuss how microfluidic, microelectronic and optic technologies can be mingled together (electrofluidics and optofluidics) to develop lab-on-a-chip devices for highly sensitive, specific and reliable biosensing applications. Specifically, I will present three representative examples: (1) silicon-bio interfaces (electrofluidics), (2) aqueous mass spectrometer using RF fields and optical monitoring (electro-optofluidics), and (3) digital microfluidics for single molecule detection (opto-fluidics). Micro/nanotechnology-enabled devices and systems serve as a fascinating starting point to increase the bio-analytical power in an exponential fashion and to bring the Moore's law into biomedical diagnostics and life sciences. My vision is that the landscape for life science industry and biomedical diagnostics is set to be transformed by continuing fundamental and translational electrofluidic and optofluidics research.

Biography:

Dr. Weihua Guan received his Ph.D. degree in Electrical Engineering from Yale University. He is currently a Postdoctoral Fellow at the Johns Hopkins University. His research interests lie in the translational and fundamental understanding and application of microfluidic, microelectronic, and photonic technologies in lab-on-a-chip devices for biomedical diagnostics and life sciences. Dr. Guan is a recipient of the Howard Hughes Medical Institute International Student Research Fellowship and Chinese Government Award for Outstanding Self-financed Students Abroad.

Light refreshments will be served.