Photoacoustic Imaging and Focusing in Deep Biological Tissue

Date: Monday, 30 March 2015  
Time: 1:00 pm – 2:00 pm  
Venue: Room 603, Chow Yei Ching Building

Speaker:  
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Abstract:

Taking advantage of rich molecular contrasts and safe non-ionizing radiation, optical imaging has been playing increasingly important roles in biomedical applications. However, a fundamental limit of optical imaging in biological tissue is light diffusion, which prohibits high-resolution imaging at depths beyond ~1mm. To break through this limit, I recently developed photoacoustic imaging and wavefront shaping technologies for in vivo functional imaging, early cancer detection, and focusing light into diffusive regimes. This presentation will first discuss the development of functional photoacoustic imaging which, for the first time, achieved real-time quantitative imaging of oxygen release from single red blood cells in living tissue and enabled measurement of extremely slow blood flow in deep tissue. Then I will present a novel technique named nonlinear photoacoustic guided wavefront shaping (nonlinear-PAWS) that can effectively focus light to its diffraction limit in highly scattering media such as deep biological tissue.

Biography of the Speaker:

Lidai Wang received the B.Sc. and M.A.Sc. degrees in precision instruments from the Tsinghua University, Beijing, China, and received the Ph.D. degree in mechanical engineering from the University of Toronto, Ontario, Canada. Since 2009, he has been working as a postdoctoral research fellow in the Department of Biomedical Engineering at the Washington University in St. Louis, Missouri, USA. His research interests focus on photoacoustic imaging, wavefront engineering, and their biomedical applications. He is the co-inventor of four patents and has published 30 papers in peer-reviewed journals, including Nature Photonics, Nature Methods, Proceedings of the National Academy of Sciences, and Physical Review Letters.