JOINT BIOENGINEERING SEMINAR SERIES

"High-throughput 3-D optical tomography"

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Abstract:
Optical tomography records the 3-D structure of a living biological specimen at nanometer resolution using ultraviolet, visible, or infrared light. Optical tomography used in tandem with a variety of fluorescence markers and multi-spectral interrogation methods have been used to record the molecular fingerprint and the physiological status of a biological specimen in a minimally invasive manner. To acquire 3-D volumetric information using a 2-D camera, several hundreds of images are typically recorded while rotating a source and detector, scanning the focus of a high-numerical-aperture lens or scanning a focused beam or a laser sheet across the volume. Thus, optical tomography has only been applied to recording biological events occurring at tens of milliseconds within almost-stationary specimens. We have conceptualized and recently demonstrated the proof-of-concept of a completely new approach to performing optical tomography. In this talk, I will describe the working principle and potential applications of this new technology.

Bio:
Yongjin Sung, Ph.D., is an assistant professor at the University of Wisconsin-Milwaukee. He received his B.S. (2000) and M.S. (2002) degrees in Mechanical Engineering (thermo-fluid science and laser diagnostics) from Seoul National University. After working in Hyundai Motor Company for five years as a research engineer, he continued study at the Massachusetts Institute of Technology and received his Ph.D. (2011) in the field of biomedical optics. Before joining UWM, he was an Instructor in Radiology at the Massachusetts General Hospital and Harvard Medical School. His doctoral and postdoctoral research have focused on theoretical and experimental studies on 3-D quantitative phase-contrast imaging techniques in the optical and X-ray regimes. His current research focuses on developing novel optical instruments for high-throughput single-cell imaging, noninvasive diagnostics of complex transport phenomena, and in situ monitoring of high-speed processes.