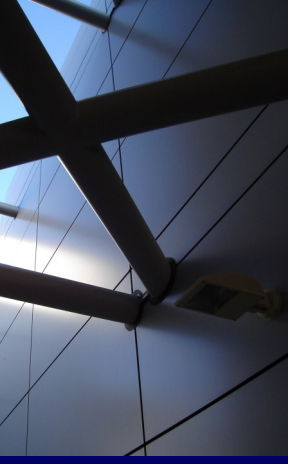

COLLOQUIUM
MECHANICAL ENGINEERING

The Department of Mechanical Engineering presents:

Sung-Yong Park, Ph.D.

University of California, Los Angeles (UCLA)
Department of Mechanical and Aerospace Engineering

Friday, April 1, 2011
10:30AM-11:30AM
Bourns Hall A265

Opto-Electro-Fluidic Integrated MEMS Devices for Droplet-based Biomedical Applications

Abstract:
Droplet-based (digital) microfluidic devices have attracted wide interests for many lab-on-a-chip applications, because of cross-contamination and dispersion issues encountered in single-phase continuous -flow microfluidic devices. In digital microfluidic devices, it is very important to achieve active control of individual droplets. Electrical-based droplet actuation mechanisms such as electrowetting-on-dielectric (EWOD) and dielectrophoresis (DEP) have been widely used due to easy implementation. However, patterning of metal electrodes, wiring and interconnection issues arise for addressing numerically large droplet arrays, which significantly increases device complexity and fabrication cost. Alternatively, light-driven mechanisms have been proposed as simple and low-cost alternatives in lab-on-a-chip systems.

In this seminar, several opto-electro-fluidic integrated MEMS devices for active droplet manipulation will be introduced, including (1) Single-sided Continuous Optoelectrowetting (SCOEW); (2) Floating Electrode OptoElctronic Tweezers (FEOET); and (3) High-speed Pulse Laser-driven Droplet Generation (PLDG). I will also discuss the device working principles for optical control of micro/nanofluidic flow and show experimental demonstrations of light-driven active droplet manipulations such as dispensing, mixing, splitting, and single-cell encapsulation for droplet-based lab-on-a-chip applications.

About the Speaker:
Dr. Sung-Yong Park is currently a postdoctoral scholar in the UCLA OptoElectronic Biofluidics Laboratory led by Prof. Pei-Yu Chiou in the Department of Mechanical and Aerospace Engineering at University of California, Los Angeles (UCLA). He received his Ph.D. in Mechanical Engineering in 2010 from UCLA, and M.S. in Mechanical Engineering in 2004 from the University of Utah, Salt Lake City, USA. His research focuses on design, fabrication, and development of opto-electro-fluidic integrated MEMS devices for lab-on-a-chip applications. His research interests include pulse laser-driven optofluidic devices for biomaterial fabrication, single cell encapsulation, and drug screening; Optoelectronic Tweezers (OET) and Optoelectrowetting (OEW) for diagnostic applications; bio/optofluidic flow physics; two-phase droplet dynamics; opto-electronic interfacial modulation; and multi-physics modeling and finite element method (FEM) analysis of complex micro/nano-scale systems.

He has published 8 archival journals and 11 conference proceedings. Not only have his research works been highlighted in the journal Nature Photonics in 2008 and 2009, respectively, but also one of the Lab on a Chip papers about optoelectrowetting (OEW) has been selected for the inside cover paper of Lab on a Chip Issue 13, 2010. He also received the 2010 Harry M. Showman Prize, which is the very only award given to the outstanding graduating student of class 2010, and acknowledged in the 2010 commencement of the Henry Samueli School of Engineering and Applied Science at UCLA.