



College of Engineering
Department of
Mechanical & Industrial Engineering

The Sidney E. Fuchs Seminar Series

3:00-3:50pm, Friday, September 2nd, 2016
Frank H. Walk Design Presentation Room



Polymer-based Nanofluidic Single Molecular Biosensors for Precision Medicine

by **Sunggook Park***

Associate Professor, Mechanical and Industrial Engineering,
Louisiana State University

Precision medicine focuses on identifying which therapies are most effective for a patient based on genetic, environmental, and lifestyle factors. In order to realize the precise medicine, the ability to obtain huge genomic data is critical and thus it is imperative to develop a new tool to enable it. Nanochannel and nanopore-based biosensors are a new platform for next generation sequencing, which does not require the amplification and fluorescence labeling of DNAs to be sequenced. However, such nanofluidic devices have been formed using high-ends fabrication tools such as focused ion beam milling and electron beam lithography, which will prevent the nanofluidic devices from being adapted for precision medicine application. This talk shows how Mechanical Engineers can contribute to achieving high throughput manufacturing of nanofluidic devices and how to help designing a new sensing mechanism. First, we will discuss high throughput manufacturing of nanopore and nanochannel single molecular sensors achieved via nanoimprint lithography. This was achieved through a fundamental study on the demolding process, which is the process step in NIL where most of imprint defects are produced. In the second part of this talk, development of a new sensor design based on time-of-flight (ToF) measurements of single molecules through a nanochannel flight tube will be presented.

* Dr. Sunggook Park is currently an Associate Professor of Mechanical Engineering at Louisiana State University (LSU). He received his B.S. and M.S. in 1996 and 1998, respectively, in the department of Chemical Engineering, Yonsei University, Seoul, Korea. He received his Ph.D. of physics from Technical University Chemnitz, Germany in 2002. The research topic for his Ph.D. dissertation was the electronic properties of surfaces and interfaces of organic semiconductors. Then, he moved to the Laboratory for Micro- and Nanofabrication at the Paul Scherrer Institute as postdoctoral research in 2002-2004 where he gained expertise on nanomolding and nanofabrication. His current research interest at LSU focuses on fundamental to the nanomolding process such as thermal and mechanical behaviors, applications of molded structures in bioMEMS/NEMS, and 3-D patterning. He is a recipient of the NSF Young Faculty Development CAREER Award in 2007. He is currently a co-PI for the NIH P41 Center for BioModular Multi-Scale Systems for Precision Medicine and is leading the LSU efforts for the center.