



STEVENS
INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

MECHANICAL & INDUSTRIAL ENGINEERING SEMINAR

FALL 2016 SEMESTER: ME 794-001

Eui-Hyeok Yang

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Stevens Institute of Technology
Castle Point on the Hudson, Hoboken, NJ 07030
Wednesday, September 14, 2016
MEC 221 LECTURE HALL ROOM
1:00 – 2:25PM**

Title: Engineered Nanomaterial Surfaces

Abstract:

My group's research is aimed at understanding some of the basic principles of 1D/2D material growth and smart polymer surfaces, solving problems relating to the implementation and application of these materials. I will present two different topics. First topic concerns our development of the low pressure chemical vapor deposition growth of 1D and 2D materials. We develop a direct growth process to enable localized, patterned, single crystalline or large-scale polycrystalline monolayers of MoS_2 , WS_2 , WSe_2 and MoSe_2 along with their heterostructures by the chemical vapor deposition method. Our growth method permits the growth of TMDs on the 'contacted' areas only, enabling fabrication of in-phase 2D heterostructures. If the technique could be developed to be highly reliable and high fidelity it could have a large impact on the future research and commercializability of TMD-based devices. The second research area concerns our development and application of smart polymer functional surfaces; we demonstrate a novel in situ control of the droplet pinning on the polymer surface, enabling the control of droplet adhesion from strongly pinned to extremely slippery (and vice versa). The pinning of organic droplets on the surfaces is dramatically controlled *in situ*, presenting a great potential for manipulation and control of liquid droplets for various applications including oil separation, water treatment and anti-bacterial surfaces. We believe that our work represents a major advance in materials science and engineering, especially pertaining to those topics that involve functional and tunable surfaces.

Biography:

Dr. E. H. Yang is a Professor of the Mechanical Engineering Department at Stevens Institute of Technology. He received Ph.D. degrees from Ajou University, Korea. After his postdoctoral training at University of Tokyo and at California Institute of Technology, Dr. Yang joined NASA's Jet Propulsion Laboratory where he was a Senior Member of the Engineering Staff. He has been the recipient of a number of awards, including NASA ICB Space Act Awards, Bonus (Level B and C) Awards and a number of Class 1 NASA Tech Brief Awards. In recognition of his excellence in advancing the use of MEMS-based actuators for NASA's space applications, he received the prestigious Lew Allen Award for Excellence at JPL in 2003. Since joining Stevens in August 2006, he has established novel research programs aimed at translating discoveries in material growth and nanofabrication into practical applications. His scholarly leadership has been recognized by peers. Examples of these efforts include being appointed as an Associate Editor and/or Editorial Board of several journals including the IEEE Sensors Journal, and being elected as the Division Chair of the ASME MEMS Division. As Principal Investigator he has been responsible for obtaining competitive research funding from several federal agencies including NSF, AFOSR, US Army, NRO, NASA and DARPA (including 6 NSF and 3 AFOSR grants, and 5 NASA and 3 NRO contracts). Dr. Yang holds over 12 patents issued or pending. Dr. Yang is the director of the Micro Device Laboratory, a Stevens's multi-user microfabrication facility, and a Co-Director of the Center for Distributed Quantum Computing at Stevens.