MECHANICAL & INDUSTRIAL ENGINEERING SEMINAR

FALL 2016 SEMESTER: ME 794-001

Prof. Chang-Hwan Choi

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Wednesday, October 5, 2016
MEC 221 LECTURE HALL ROOM
2:00 – 3:00PM

"Nanoengineering of Bioinspired Multifunctional Superhydrophobic Surfaces"

Abstract:
Nature, such as plants, insects, and marine animals, uses micro/nano-textured surfaces in their components (e.g., leaves, wings, eyes, legs, and skins) for multiple purposes, such as water-repellency, anti-adhesiveness, and self-cleanness. Such multifunctional surface properties are attributed to three-dimensional surface structures with modulated surface wettability. Especially, hydrophobic surface structures create a composite interface with liquid by retaining air between the structures, minimizing the contact area with liquid. Such non-wetting surface property, so-called superhydrophobicity, can offer numerous application potentials, such as hydrodynamic drag reduction, anti-biofouling, anti-corrosion, anti-fogging, anti-frosting, and anti-icing. Over the last couple of decades, we have witnessed a significant advancement in the understanding of surface superhydrophobicity as well as the design, fabrication, and applications of superhydrophobic coatings/surfaces/materials. In this talk, the designs, fabrications, and applications of superhydrophobic surfaces for multifunctionalities will be presented, including hydrodynamic friction reduction, anti-biofouling, anti-corrosion, and anti-icing. Future potential applications of the superhydrophobic surfaces will also be discussed briefly, including self-assembly of nanomaterials and nanofluidic energy harvesting.

Biography:

Dr. Chang-Hwan Choi is an Associate Professor in the Department of Mechanical Engineering at the Stevens Institute of Technology. He acquired his BS (1995) and MS (1997) in Mechanical & Aerospace Engineering from Seoul National University in Korea. He also earned his MS in Fluids, Thermal, and Chemical Processes from Brown University in 2002. Dr. Choi received his PhD in Mechanical Engineering from the University of California at Los Angeles (UCLA) in 2006, specializing in MEMS/Nanotechnology and minoring in Fluid Mechanics and Biomedical Engineering. He has two-year (1996, 2000) work experience at Korea Aerospace Research Institute and three-year (1997-1999) teaching experience at Chandrakasem Rajabhat University in Thailand. His research activities include large-area nanopatterning and nanofabrication, fluid physics and heat transfer at nanoscale interfaces, self-assembly of nanomaterials, nanofluidic energy harvesting, and cell-material interactions, funded by various federal agencies in US (NSF, DARPA, ONR, ARMY, and DOE) and industries. He is a recipient of the 2010 Young Investigator Program (YIP) award by the US Office of Naval Research (ONR) for his efforts in the development of hydrodynamically-efficient anti-corrosion surfaces, which was also highlighted in Nature. (http://www.nature.com/naturejobs/2010/100520/pdf/nj7296-385a.pdf). He was also selected as one of Nanotechnology Thought Leaders in 2010 by AZoNano (The A to Z of Nanotechnology). In 2013, he was designated one of the eight US delegates to attend the CRDF Global Workshop to present and discuss the developments in energy research and collaboration between the US and foreign countries.

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