

SMU Department of Mechanical Engineering SEMINAR

“Carbon Nanomaterials-The route toward applications”

Professor Wonbong Choi

*Department of Materials Science and Engineering, Department of
Mechanical and Energy, University of North Texas*

Friday, November 1, 2013

3:00 p.m. – 4:00 p.m.

Location: Huitt-Zollars Pavilion

Abstract: This talk will focus on engineering of carbon nanomaterials, graphene and carbon nanotubes (CNTs), and their applications in energy and electronics. Particularly the interfaces of graphene/substrates and CNTs/substrates will be highlighted towards high efficiency Li-ion battery, electronics, and flexible solar cells. Our recent development of new structures of multifunctional metal-graphene-CNTs and 3dimensional (3D) graphene/CNTs will be presented. The three-dimensional nanostructured hybrid materials, with better interfacial contacts and volume utilization, can stimulate the development of several energy-efficient technologies. The unique 3D design of the electrode allowed much higher solid loading of active anode material, CNTs in this case and resulted in more amount of Li^+ ion intake in comparison to those of conventional 2D anode. Though one such 3D anode was demonstrated to offer 50% higher capacity, compared to its 2D counterpart, its ability to deliver much higher capacity, by geometrical modification, is presented. Our recent results of bonding energy characterization in nano scale will be introduced to offer the optimum interfacial structure of carbon nanomaterials/substrates. We measured the nano-scale graphene/metal adhesion energy on metal substrates and silicone substrate at various conditions. Our efforts on the strategies of manipulation of carbon nanomaterials towards high efficiency energy applications will be reviewed and critical issues will be discussed.

Bio: Dr. Choi is a tenured, full professor in the Department of Materials Science and Engineering at University of North Texas, Denton. He joined the department in July 2012 after his work in Florida International University (FIU) as a tenured full professor. He joined FIU as an Associate Professor in the Mechanical and Materials Engineering Department in June 2003. Dr. Choi obtained his Ph.D in Materials Science and Engineering from the North Carolina State University (NCSU) in 1997. In period spanning from 1988 to 1993, he worked as a Research Scientist at Agency Defense & Development in fine ceramic-metal composites materials. After his PhD, Dr. Choi worked in the industry research laboratory as a senior researcher and project manager at Samsung (SAIT). He was a leading scientist in the “Carbon Nanotubes for Tera-level Nano electronics Device” project with more than \$1.0 M/year support from SAMSUNG and the Government of Korea. Choi has been awarded the prestigious Materials Research Society (MRS) Medal for 2006. He awarded MRS fellow as the youngest person named as a Fellow in 2009. His research is funded by AFOSR, DARPA, NSF, SRC, DOE and Samsung. Dr. Choi is the author/co-author of over 70 patents, 1 book (“GRAPHENE” CRC Press 2011), 7 book chapters, over 180 publications, which includes 130 peer-reviewed journal articles and over 50 conference proceedings. His research articles have been cited more than 4,500 times with H-index of 33.