東京大学大学院工学系研究科専攻間横断型教育プログラム
「機械システム・イノベーション」

東京大学 THE UNIVERSITY OF TOKYO

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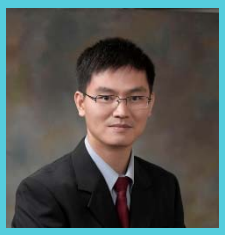
## 第172回GMSI公開セミナー/第62回GSDMプラットフォームセミナー

# Tailoring Carbon Nanomaterials for Emerging Applications

応用に向けたナノカーボンのチューニング




**Associate Professor Yuan Chen**

**School of Chemical and Biomedical Engineering,**
**Nanyang Technological University**


**日 時: 2015年6月23日(火) 13:30-15:00**
**場 所: 東京大学工学部2号館 31A会議室(機械系会議室)**


Carbon nanomaterials are one of the most important outcome of 'Nanotechnology', which has the strong impact in the social system through innovative energy system, innovative information technology, and innovative environmental system. Carbon nanotubes, graphene, fullerenes, and mesoporous carbon structures are a new class of carbon materials that hold promises in revolutionizing our life owing to their extraordinary electronic, thermal and mechanical properties. These properties rely on their unique nanoscale structures. My research interests focus on designing and developing chemical processes to (1) synthesize carbon materials with well-defined nanostructures, (2) assemble carbon nanomaterials into functional macroscale structures, and (3) utilize these novel carbon structures for electronics, sustainable energy and environmental applications. Three research topics will be discussed in my talk. First, we demonstrated the feasibility of manipulating the chirality and metallicity of single walled carbon nanotubes (SWCNTs) through catalytic chemical vapor deposition. In particular, sulfur doped cobalt catalysts were developed to selectively grow large-diameter semiconducting (9,8) SWCNTs of 1.17 nm in diameter, which have potential applications in emerging macroelectronics and optoelectronics for future telecommunication. Second, we created novel nanocarbon composites with tailored structures for energy storage and electrocatalysts. We used capillary columns as hydrothermal reactors to assemble graphene and SWCNTs into a unique multiscale hierarchical structured hybrid fiber, which has one of the highest volumetric capacitance among all reported porous carbon materials. The hybrid carbon fibers were employed to construct fiber supercapacitors as energy storage solutions for emerging miniaturized electronics and smart fabrics/textiles. Last, we showed that metallicity, dispersibility, and size governs the antibacterial activity of SWCNTs and graphene, which provide useful insights for developing strategies that can increase their biomedical and environmental application potentials, such as membranes for water treatment, while minimizing their environmental and health risks.


---About the Speaker--- Dr. Yuan Chen received his BE in Chemical Engineering and ME in Biochemical Engineering from Tsinghua University. He obtained his PhD in Chemical Engineering at Yale University in 2005. He joined the School of Chemical and Biomedical Engineering (SCBE), Nanyang Technological University, Singapore, as an Assistant Professor in 2005. In 2010, he was promoted to a tenured Associate Professor. He was also a visiting Associate Professor at Brown University in 2010, and a visiting Chair Professor at Tianjin University of Technology in China since 2011. He served as the Head of Chemical and Biomolecular Engineering Division in SCBE from July 2011 to June 2014. He received Young Scientist Award by the Singapore National Academy of Science in 2011, inspirational teaching award of Koh Boon Hwee scholar in 2014, and Excellence in Review Award for the journal Carbon in 2015. He is currently the editorial board member for Carbon, Journal of Nanomaterials, and Heliyon (Elsevier).

主催: 東京大学大学院工学系研究科「機械システム・イノベーション」プログラム(GMSI)
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