

UNIVERSITY OF HOUSTON  
CULLEN COLLEGE OF ENGINEERING

Center for Integrated Bio and Nano Systems  
**SPEAKER SERIES**

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**PRESENTS**

**From Diamond to Graphene and Nanotechnology  
Enabled Practical Applications to Molecular Sensing and  
Lithium Ion Battery**



**Dr. Yonhua (Tommy) Tzeng**

National Cheng Kung University Chair and Distinguished Professor  
President and Fellow of IEEE Nanotechnology Council

**Friday, February 9, 11:15 am**

**Classroom and Business Building, Room 122**

**LECTURE ABSTRACT**

Both diamond (sp<sup>3</sup>) and graphite (sp<sup>2</sup>) exhibit many useful physical and chemical properties desirable for scientific, technological and consumer applications. High-rate homoepitaxial diamond CVD and high-density heterogeneous diamond nucleation, when combined with smart grain-boundary engineering and doping techniques, have produced insulating and semiconductor single crystalline and polycrystalline diamonds ranging from individual 10-carat diamond crystals to table-top sized coatings of ultra-nano-crystalline diamond with 2-5 nm grain sizes.

Alternatively, 2-D atomically thin graphene, which is a derivative of diamond's cousin (graphite), possesses excellent electronic, optical, thermal, mechanical, and chemical properties due to its sp<sup>2</sup> carbon-carbon bonding without surface dangling bonds and unique electronic structures. Hybrid carbon nanostructures of diamond and graphene provide further opportunities of innovative applications. In this seminar, diamond and graphene related carbon technology will be reviewed with some examples of recent research results in nanocarbon enabled high-sensitivity molecular sensing by Surface Enhanced Raman Scattering and high-energy-storage-density and long-cycling-life lithium ion battery. He will also introduce IEEE NTC's missions in promoting nanotechnology for better humanity and its sponsored technical and educational activities.

**SPEAKER BIOSKETCH**

Professor Yonhua (Tommy) Tzeng is Fellow and President of IEEE Nanotechnology Council, which is made of 22 IEEE Societies. He is currently a faculty member and formerly served as the Vice President for Research and Development, Dean of College of Electrical Engineering and Computer Science, and Director of Center for Micro-Nano Science and Technology at the National Cheng Kung University (NCKU). Prior to joining NCKU, he served as an Associate Director of Alabama Micro/Nano Science and Technology Center and Alumni Chair Professor of Electrical and Computer Engineering at Auburn University in Auburn, Alabama. Professor Tzeng's research includes more than thirty years of CVD diamond synthesis and applications. His research interest extends to graphene and nanoscale materials for innovative electronics, sensors, and energy storage devices. Professor has been awarded more than 50 patents and published more than 200 refereed journal and conference papers.

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