Keynote Speaker 2

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2D and 3D Graphene Technology for Sensors and Energy Storage Applications

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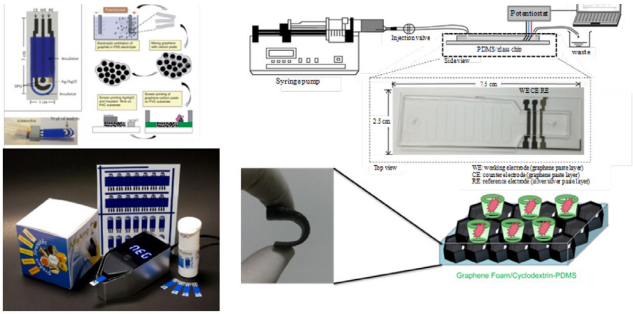
Dr. Adisorn Tuantranont's Biography

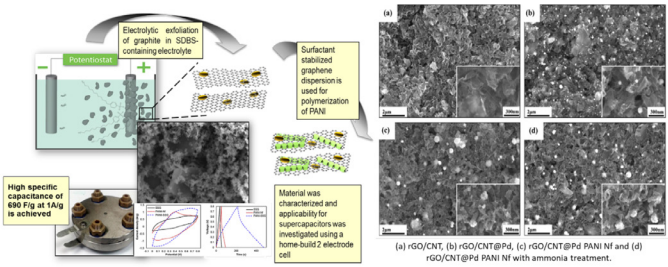
Dr. Adisorn Tuantranont received B.Eng. degree in Electrical Engineering from King Mongkut's Institute of Technology Ladkrabang (KMITL) in 1995 and the M.S. and Ph.D. degrees in Electrical Engineering (Photonics and MEMS) from University of Colorado at Boulder in 2001. Currently he serves as NSTDA Researcher Fellow and Graphene and Printed Electronics Research Group Director at National Security and Dual-use Technology Center, National Science and Technology Development Agency (NSTDA). From 2001-2014, he served as the Lab director of Nanoelectronics and MEMS Laboratory, National Electronic and Computer Technology Center (NECTEC) in Thailand. Since 2012, he found and worked as Director at Thailand Organic and Printed Electronics Innovation Center (TOPIC), NSTDA. His research interests are in the area of Micro/ Nano-Electro-Mechanical Systems (MEMS/NEMS), Microfabrication, Advanced Materials eg. Graphene, Nanotube, Nanowire, Nanoelectronics, Lab-on-a-chip and Printed Electronics Technology. He authors more than 140 refereed journal papers and 350 international proceeding papers including 1 International PCT patent, 5 granted Thai patents and more than 30 patents applications (Scopus h-index = 33, Citation =4,111 and Web of Sciences h-index= 31, Citations = 3,139 as 15 Jan 2019). He has been awarded Young Technologist Award in 2004 from Foundation for the Promotion of Science and Technology under the Patronage of H. M. the King. Now he is a member of Thai Academy of Science and Technology Foundation (TAST)

and TRF Senior Research Scholar awarded by Thailand Research Fund. He award Toray Science Foundation in 2019. He worked as Executive Advisor at Thailand Advanced Institute of Science and Technology (THAIST), National Science Technology and Innovation Policy Office, Ministry of Science and Technology of Thailand from 2016-2017. From 2016, he is elected to be NSTDA Research Fellow (Professor) and served as General Secretary of Materials Research Society of Thailand (MRS-Thailand).

Abstract

2D and 3D Graphene has received increasing attention due to its unique physicochemical properties including high surface area, excellent conductivity, high mechanical strength, and ease of functionalization and synthesis. Recent developments on 2D graphene sensors are comprehensively presented. Screen printed graphene sensors exhibited promising properties with good reliability suitable for various applications such as food pathogen and biomedical sensors. A rapid detection platform for Aflatoxin (AflaSense), Vibrio parahaemolyticus (VIP-Sens), Tuberculosis (TB-Sense), Human leukocyte antigen (HLA) gene and Thalassemia using loop-mediated isothermal amplification (LAMP) and disposable electrochemical sensors based on screen-printed graphene electrode (SPGE) will be presented. Moreover, a successful microfluidic device with integrated printed graphene-based electrochemical electrodes by screen printing technique for in-channel amperometric detection for iodide and glutathione detection will be presented. In addition, a flexible 3D graphene sensor has been successfully fabricated and applied for detection of dopamine, a neurotransmitters and marker for Parkinson's disease. These sensors have numerous advantages including low fabrication cost, high sensitivity, high throughput and satisfactory reproducibility. Another focus research area is energy storage applications including battery and supercapacitor. 3D hollow graphite nanotetrapods by Vapor Phase Transport and In-situ Chemical Vapor Deposition/Etching is the technique used to fabricate 3D graphene for high-performance lithium-sulfur batteries based on 3-D graphene foam electrodes. Free standing of 3 layers graphene-sulfur cathode for Li-S battery is also demonstrated. For high power density applications, novel surfactant-stabilized graphene-polyaniline composite nanofiber for supercapacitor applications is successful achieved at 640 F/g. Moreover, ammonia strengthened graphene/CNT-wrapped polyaniline-nanofiber composites loaded with palladium nanoparticles supercapacitors is demonstrated at 611.8 F/g.





Keywords: Graphene, Printed Electronics, Sensors, Food Pathogen Sensors, Supercapacitor, Battery, Energy Storage

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