Women in Sensors (WiSe) Virtual Workshop
2-4 pm 17 September, 2020
Organised by
IEEE Sensors Council NSW Chapter

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Objectives of the WiSe Workshop

- Discuss the opportunities in capabilities and emerging applications of sensors along with research collaboration to support the ongoing global COVID-19 pandemic.
- Promote and support women in Sensors.
- Encourage young generation of female researchers to work on sensors.

Virtual workshop program

Time		
2:0pm to 2:05pm	Prof. Subhas Mukhopadhyay Chair, IEEE SC NSW Chapter	Introduction of the Chapter and activities
2:05pm to 2:10pm	A/Prof. Guozhen Liu Vice-Chair, IEEE SC NSW Chapter	Welcome to all for the Wise Event
2:10pm to 2:45pm	Associate Professor, Debbie S. Silvester, Curtin University	Talk 1: Amperometric Gas Sensing using Miniaturised Electrodes and Ionic Liquids
2:45pm to 3:20pm	Professor Yaqing Liu, Tianjin University of Science and Technology	Talk2: Multifunctional bio-nano platforms: from intelligent and portable detection to sterilization of pathogenic bacteria
3:20pm to 3:55pm	Associate Professor Aimin Yu, Swinburne University of Technology	Talk3: Graphene Enhanced Electrochemical Sensing Platforms
3:55pm to 4:0pm	Prof. Subhas Mukhopadhyay Chair, IEEE SC NSW Chapter	Concluding remarks

Invited speakers

Associate Professor, Debbie S. Silvester, Curtin University

Assoc. Prof. Debbie Silvester is an electrochemist and ARC Future Fellow in the School of Molecular and Life Sciences at Curtin University, Perth. She completed her DPhil (PhD) at the University of Oxford, UK. In 2012, she was awarded an ARC Discovery Early Career Research Award (DECRA) and in 2017, an ARC Future Fellowship. Among her many awards, she is a recipient of recent awards of a 2019 Rennie Memorial Medal, a 2019 WA Young Tall Poppy award, and the 2017 Peter W. Alexander Medal. Currently, she is the secretary for the Electrochemistry Division of the RACI, the Australia/New Zealand representative for the International Society of Electrochemistry (ISE), and is a member of the editorial board for *Scientific Reports* and *Frontiers in Chemistry*.

Talk abstract

The first amperometric gas sensor (AGS) was introduced by Leyland Clark and colleagues in 1953, and many modern commercially-available AGSs are still based on variations of this design. However, the lifetime of AGSs is limited in hot and dry conditions due to solvent evaporation. Room temperature

ionic liquids (RTILs) have strong potential for use as alternative 'designer solvents' in membrane-free AGSs, which would solve the existing technological problems, including the slow diffusion through the membrane and solvent evaporation. Their non-volatility would enable the membrane to be dispensed with, and the entire sensor to be miniaturised to provide optimal functionality over a much wider range of ambient conditions and with a longer lifespan. In this talk, I will discuss some of our recent advances in this area where we have employed miniaturised, planar electrodes for gas sensing. In particular, I will show that the choice of ionic liquid is crucial in high humidity gas environments, due to the structuring and layering of the ions in the electrical double layer.

Professor Yaqing Liu, Tianjin University of Science and Technology

Prof. Yaqing Liu received her PhD degree in 2006 from Changchun Institute of Applied Chemistry, Chinese Academy of Sciences (CIAC-CAS). From 2007 to 2010, Dr. Liu worked as a postdoctoral fellow in Peter Grünberg Institute (PGI-8), ForschungszentrumJülich, Germany. She moved back to CIAC-CAS in 2010 and became a full professor in 2012. In 2015, Dr. Liu joined Tianjin university of Science and Technology. Her research fields involve in synthesis of bio-nanomaterials, fabrication of molecular devices and molecular logic gates and their applications in food safety and serious disease diagnosis and therapy. Dr. Liu has 4 authorized patents and over 60 articles in international journals, including Angew. Chem. Int. Ed., ACS Nano, J. Am. Chem. Soc., Adv. Sci., Chem. Sci. etc.

Talk abstract

Bacterial infections are a growing public health concern and cause a huge medical and financial burden. It is of significance to construct platforms for bacterial detection and efficient elimination For the first time, a target (pathogenic bacterial gene)-induced logically reversible logic gate was constructed as an intelligent biosensor, which has one-to-one mapping functionality and can rapidly distinguish all information of the two targets, the presence of any target and the absence (or presence) of both targets. By integrating DNA-templated silver nanocluster, a DNA multiplexer was constructed to identify pathogenic genes, E. coli and S. aureus genes, with single fluorescent readout. Meanwhile, several portable sensing platforms were constructed for high sensitive and in-situ detection of bacteria. Herein, several multifunctional platforms were constructed for high efficient bacteria capture, detection and photothermal elimination.

Associate Professor Aimin Yu, Swinburne University of Technology

A/Prof Aimin Yu received her PhD in Chemistry at Nanjing University (China). After being a post-doctor at Max Planck Institute of Colloids and Interfaces (Germany) for two years, Aimin moved to Australia in 2003 working as a research fellow at the University of Melbourne and the University of Queensland for four years. Aimin currently is an Associate Professor at Swinburne University of Technology where she leads the Swinburne Functional Materials and Surfaces Group. Aimin has co-authored more than 180 journal articles in these fields with an h-index of 39 (Google Scholar). She was selected as one of the two Swinburne delegates for the inaugural WATTLE Women Leadership Program I 2018. In her service role, Aimin has been the Academic Director of Research Training for the School of Science since 2017.

Talk abstract

Two-dimensional (2D) materials are crystalline materials consisting of a single layer of atoms. Due to their unique structures and properties, they have attracted considerable interests in recent years. In this talk, I will introduce our recent work on the utilization of graphene to enhance the electrochemical sensing performance. Examples include the preparation and functionalization of graphene composites and their applications in electrochemical detection of various biomolecules include antibiotics, dopamine and DNA. The section is then focused on the introducing a graphene sensing platform for the plant species identification. This work was based on the electrochemical fingerprinting of pollen by the combination of cyclic voltammetric scan and advanced data analysis techniques.