



WEBINAR - TECHNICAL TALK

Organised by Material Engineering
Technical Division (MaTD)



TO REGISTER

ENERGIZING ENERGY-INNOVATIONS: ATOMIC-LEVEL ENGINEERING OF 2D NANOMATERIALS FOR PHOTO/ELECTRO-CATALYSIS TOWARD RENEWABLE ENERGY APPLICATIONS

BEM APPROVED CPD HOURS: 2.0
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**4 MARCH 2022
FRIDAY
3:00PM - 5:00PM**

by Assoc. Prof. Dr. Wee-Jun Ong



IEM Students: FOC | IEM Members: RM15 | Non-IEM Members: RM70

SYNOPSIS

With the gradual improvement of people's living standards, the energy shortage and serious environmental pollution have become major problems that human beings have to face in the 21st century. The utilization of renewable energy from the sunlight is one of the appealing approaches to overcome the climate change and address the resources of fossil fuels.

Recently, two-dimensional (2D) nanostructure (e.g. graphene, graphitic carbon nitride (g-C₃N₄)) has become an emerging field of photocatalysis research owing to its atomically thin sheet-like materials. Noble metals have been widely used as the co-catalysts for solar energy conversion. Due to the scarcity of noble metals, the development of noble-metal-free catalysts has raised the wave of interests among the scientific community at present.

In this plenary talk, the state-of-the-art research advancement in our group toward effective photo/electro-catalysis using noble-metal-free 2D nanocomposites will be presented. To further enhance the photocatalytic efficiency, constructing heterojunction nanocomposites with dimensionality-dependent metal phosphide and metal dichalcogenide can act as a pivotal role to hinder the charge recombination. The charge carrier mechanisms are systematically elucidated by the photoelectrochemistry and the first-principles density functional theory (DFT) calculations.

Apart from that, single atom catalysis (SAC) has been employed to tune the reactivity of g-C₃N₄ toward improved electrocatalytic activity. Other emerging 2D nanostructures for energy applications will be presented alongside the environmental assessments. Overall, the research paves a new prospect toward engineering of 2D-based nanoarchitectures with robust active sites, improved charge separation and kinetics for clean energy applications to establish the structure-activity relationships. As such, this can be extended to diverse energy-related applications in batteries, supercapacitors, and solar-powered devices.

SPEAKER'S PROFILE

Wee-Jun Ong received his BEng and Ph.D. degrees in Chemical Engineering from Monash University. In 2016, he joined Institute of Materials Research and Engineering (IMRE), Agency for Science, Technology and Research (A*STAR) in Singapore as a Staff Scientist. He is currently an Associate Professor in the School of Energy and Chemical Engineering at Xiamen University Malaysia since 2019. In 2019, he was a Visiting Scientist in the Center for Advancing Electronics Dresden (cfaed) at Technische Universität Dresden, Germany. He was also a Visiting Professor at the Lawrence Berkeley National Laboratory, USA from 2019 to 2020.

Starting from 2021, Prof. Ong becomes the Director of Center of Excellence for NaNo Energy & Catalysis Technology (CONNECT) at Xiamen University Malaysia. His research interests focus on photocatalytic, photoelectrocatalytic and electrochemical H₂O splitting, CO₂ reduction and N₂ fixation using nanomaterials. In 2018, he has been named the Emerging Investigator in the Journal of Materials Chemistry A. He has authored, corresponding-authored and co-authored >100 papers published in top-tier journals such as Chemical Reviews, Advanced Materials, Chem, Angewandte Chemie, Small, Materials Horizons, Nano Energy, ACS Nano, etc. His citations are more than 12,000 with an H-index of 47.

He is named as a Global Highly Cited Researcher by Clarivate Analytics from 2019 to 2021 for three consecutive years. He is also named as the “World’s Top 2% Scientist” in 2020 and 2021 by Stanford University. He was awarded several prestigious awards, including the Young Researcher Award by the IChemE Singapore and Malaysia (2017 and 2018), Green Talent Award by the German Federal Ministry of Education and Research (2018), Merdeka Award Grant (2018), to name a few.

He has been the Lead Guest Editor of Small, ChemSusChem, Nanoscale, Solar RRL, ACS Applied Materials & Interfaces and Chemistry – A European Journal. Currently, he serves as the Chief Editor of Frontiers in Nanotechnology, Associate Editor of Frontiers in Chemistry, Beilstein Journal of Nanotechnology and Engineering Reports, Advisory Board of Materials Horizons, Young Star Editor of Nano Research, and Board Member of SmartMat, Chinese Journal of Catalysis, ChemNanoMat and Nanotechnology.