



School of Materials Science and Engineering



**Seminar Topic:
2D Materials for Sustainable World: Electrocatalysis, Low-power
Device and Machine Learning**

Associate Professor Liu Zheng

Abstract

Using green energy or increase energy efficiency is the key to a sustainable world. In this seminar, I will introduce the potentials of 2D materials to build a sustainable world in terms of low-cost H₂ generation, low-power-consuming device, and IA enabled optimization of novel materials.

Semiconducting catalysts are great candidates to replace noble metal to make green energy such as H₂ due to their low cost. Using 2D materials as the model system, we have revisited the semiconductor-electrolyte interface and unraveled a universal self-gating phenomenon through micro-cell based measurements. We unveiled a surface conductance mechanism that dominates the charge transport in semiconductor electrocatalysts. Based on this, we provided a guideline on how to design high-performance semiconductor electrocatalyst.

Apart from the generation of green energy, we are also using 2D materials to build next-generation CMOS architecture, such as negative capacitance field-effect transistors, which may dramatically reduce the consumption of energy.

Finally, I will discuss our recent progress on the machine learning guided materials synthesis, as well as the novel design of neural networks hardware based on 2D materials.

Biography

Dr Liu Zheng is an Associate Professor in the School of Materials Science and Engineering (MSE) at Nanyang Technological University (NTU), Singapore. He has published more than 200 papers with total citations more than 27,000 and H-index of 75. Dr Liu was the finalist of the World Technology Award in Energy category in 2012. In 2013, he was awarded the prestigious Singapore NRF Fellowship and the elite Nanyang Assistant Professorship. He was awarded ICON-2DMAT Young Scientist Award and the prestigious Singapore Young Scientist Award in 2018. He was among the highly cited researchers in 2018 and 2019. He was named Materials Research Society of Singapore Chair Professorship in 2019 and awarded Asia's Rising Scientists and the Nanyang Research Award (Young Investigator) in the same year.

Dr Liu Zheng works on the synthesis of high-quality and large-size novel 2D monolayers, especially transition metal dichalcogenides (TMDs) and their applications in catalysis and electronics.

Wednesday, 19 August 2020 || Time: 2:00 pm – 3:00 pm ||
Live Streaming Link (Zoom Meeting): <https://ntu-sg.zoom.us/j/94454994280>
Meeting ID: 944 5499 4280 Passcode: 0x870v
Hosted by: Assistant Professor Martial Duchamp

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