School of Materials Science and Engineering

Seminar Topic:
Improved Catalysis for The Sustainable Electrosynthesis of Our Most Coveted Chemicals

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Abstract
Our most commonly produced chemicals, such as hydrogen, ethylene, ammonia and hydrogen peroxide, are currently produced in large-scale centralised plants. The transport of these reactive compounds to the end user poses significant safety and logistical challenges. However, with the advent of inexpensive renewable electricity, electrochemical routes of synthesising these chemicals are becoming increasingly attractive. Low temperature electrochemical devices are particularly amenable towards coupling with renewables. They require little infrastructure; as such, they could allow for localised chemical production at the point-of-consumption.

It turns out that the catalyst material at the electrode, i.e., the electrocatalyst, controls the efficiency of electrosynthesis. I will present our research on the electrocatalysis of (i) O\textsubscript{2} evolution for water electrolysis\textsuperscript{1,2} and (ii) oxygen electroreduction to hydrogen peroxide,\textsuperscript{3,4} (iii) N\textsubscript{2} reduction to NH\textsubscript{3}\textsuperscript{5} Our experiments span the atomic scale to real devices.

References:

Biography
Dr Ifan obtained his PhD from the University of Cambridge. He moved to the Department of Physics at the Technical University of Denmark (DTU) in 2008 where he was first employed as a Postdoctoral Researcher, then as Assistant Professor and finally as Associate Professor. In 2015, Dr Ifan obtained the Peabody Visiting Associate Professorship award from Massachusetts Institute of Technology (MIT) where he taught and conducted research at the Department of Mechanical Engineering at MIT for a whole semester. He then moved to the Department of Materials at Imperial College London in 2017. He currently holds the position of Reader in Electrochemistry.

His research aims to enable the large-scale electrochemical conversion of renewable energy to fuels and valuable chemicals and vice versa. Such processes will be critical to allow the increased uptake of renewable energy.

Thursday, 18 March 2021 ǁ Time: 5:00 pm – 6:00 pm ǁ (Singapore)
Thursday, 18 March 2021 ǁ Time: 9:00 am – 10:00 am ǁ (London)
Live streaming via Zoom Meeting:
https://ntu-sg.zoom.us/j/96790235814
Meeting ID: 967 9023 5814  Passcode: 180321
Hosted by: Associate Professor Jason Xu Zhichuan

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