

School of Materials Science and Engineering



**Seminar Topic:  
Solution Processed Materials for Next Generation Solar Cells and Artificial  
Photosynthesis**

**Associate Professor Lydia Helena Wong**

**Abstract**

The increasing need of energy consumption and concerns over global warming prompt the urgent quest of clean and renewable energy sources. Efficient harvesting and utilization of the solar energy is a feasible method to meet the world's energy demand in a clean and sustainable way. To extend solar energy applications beyond the utilization of solar panels on the rooftops and solar field, a more advanced technology involving new materials, novel processing and fabrication techniques, are required. Fabrication of high quality semiconductor film and nanostructures using solution methods is one promising approach in the discovery of materials with new properties and functionalities. However most of the low band-gap semiconductor photoabsorber still needs major breakthrough in improving their charge transport properties.

In this talk, I will give an overview of our work in improving the bulk optical and electronic properties of semiconductor photoabsorbers, fabricated using solution methods. In particular, I will share our strategy in producing solution processed Cu kesterite thin film solar cells with high power conversion efficiency. I will also review our activities in artificial photosynthesis using nanostructured metal oxide ( $\text{Fe}_2\text{O}_3$ ,  $\text{Fe}_2\text{TiO}_5$ ,  $\text{FeVO}_4$ , etc), particularly in improving the charge transport and separation efficiency by doping, surface passivation and co-catalyst integration. An unassisted water splitting demonstrated by a tandem cell of hematite photoanode stacked with a perovskite solar cell will also be presented.

**Biography**

Dr Lydia Wong is an Associate Professor at the School of Materials Science and Engineering in Nanyang Technological University Singapore (NTU). She graduated with Bachelor of Applied Science (First Class Honors) and Doctor of Philosophy, both in Materials Science and Engineering from NTU. After her PhD, she worked as a Senior Engineer at Chartered Semiconductor (renamed to Global Foundries) on advanced microelectronic devices. She was also a Visiting Scholar at the Department of Chemical Engineering in Stanford University where she worked on organic photovoltaics. She has published more than 100 publications in international peer reviewed journals and given invited talks at international conferences particularly in the area of thin film solar cells and solar water splitting.

Her research interest is in the structural and chemical modification of semiconductor materials for clean energy and electronics applications.

**Wednesday, 18 September 2019 || Time: 2:00 pm – 3:00 pm  
Venue: MSE Meeting Room (N4.1-01-28)  
Hosted by: Nanyang Assistant Professor Mihaiela Stuparu**