CBC-NAP SEMINAR ANNOUNCEMENT

Dr Lee Hiang Kwee  
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Unravelling the Unique Microenvironment at Nanoparticle@MOF Interface and their Application in Gas-based Catalysis

Gas reactions are prevalent in the industry and in our everyday lives. These processes typically require high temperature/pressure to boost gas concentration and energy for reaction activation. However, current practices are unsustainable because they are energy-intensive and potentially dangerous. Here, we achieve efficient gas-based reactions at remarkable ambient conditions by concentrating gas molecules at the interface formed between a functional solid and a metal-organic framework (MOF) with excellent gas sorptivity and selectivity. Using surface-enhanced Raman spectroscopy (SERS), we directly observe the accumulation of gas molecules into a quasi-condensed phase at the nanoscale solid@MOF interface, even at ambient operations. We further leverage on this pseudo high-pressure microenvironment to (1) activate the CO2 carboxylation of an arene that is otherwise inert at 1 atm and 298 K, and to (2) achieve efficient and selective electrochemical nitrogen-to-ammonia transformation. Our unique nanoparticle@MOF design thus offers enormous opportunities in relevant fields including heterogeneous catalysis, greenhouse gas removal and gas valorizations.

Biography
Hiang Kwee Lee received his Ph.D. degree in Chemistry and Biological Chemistry from Nanyang Technological University (NTU) in 2018. In the same year, he was awarded the NTU International Postdoctoral Fellowship under MOE-START scheme to support his post-doctoral studies at Stanford University. He is currently an Assistant Professor at NTU Chemistry division, and his research bridges chemistry, nanotechnology, and material sciences to address critical energy and environmental issues.

Date: 21st January 2021 (Thursday)  
Time: 3.00pm to 4.00pm  
Venue: Zoom Platform  
Host: Professor Atsushi Goto

For Zoom registration: