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SEMINAR SERIES



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Title | **Water Electrolysis: A Pathway to Green Hydrogen Production**

Abstract | Driven by the growing need for clean and sustainable energy sources, a number of carbon-neutral energy conversion technologies have been extensively explored over recent years, which include photo- and electrocatalytic water-splitting systems, fuel cells, and metal ion batteries. In particular, water electrolysis, consisting of hydrogen evolution reaction (HER) and oxygen evolution reaction (OER), is considered a promising and efficient way to produce a clean energy carrier, hydrogen, to meet such energy demands. Green hydrogen produced by renewable-energy-powered water electrolysis could help resolve the energy crisis and cut our carbon footprint at the same time.

So far, the most efficient catalysts developed for both HER and OER make use of precious metals, which largely hinders their wide application due to their high cost and limited availability. Transition metal compounds based on earth-abundant elements can offer an economically-viable platform for electrocatalytic chemical and energy conversions. In terms of catalytic efficiency and stability, however, these catalysts still need proper tuning of surface property, electronic configuration, and morphology to win over the noble-metal-based ones. In this talk, several strategies and material systems we develop to realize effective water-splitting catalysis will be presented with a special focus made to the cases of emerging material systems and their characterization. I will also briefly discuss a new way of upcycling waste materials into selective and efficient water-splitting electrocatalysts.

Bio | Prof. Lawrence Yoon Suk Lee earned his Ph.D. from McGill University, Canada, in 2006 and currently serves as a Professor in the Department of Chemistry, the Hong Kong Polytechnic University. He leads a research group specializing in electrochemistry, with a focus on the design and development of advanced nanomaterials and nanocomposites for (photo)electrocatalytic applications, including water splitting and CO2 reduction.

Prof. Lee's work centers on unravelling structure–activity relationships to optimize reaction mechanisms, contributing to breakthroughs in sustainable energy technologies. His research interests also encompass the development of electrode materials for lithium- and sodium-ion batteries, as well as the environmentally responsible upcycling of spent cathode materials. Employing cutting-edge electrochemical and photochemical techniques, alongside state-of-the-art characterization tools, Prof. Lee's team investigates the atomic structures of nanomaterials and their catalytic evolution, aiming to advance the science of sustainable energy conversion and storage.

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