Rational Design of Organic Nanostructure Arrays for Molecular Nano-Devices

State Key Laboratory of Chemical Resource Engineering

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地　点：化新楼B座 211（篮球场北侧）

Biography:

Dr. CHEN Wei is currently an Associate Professor (2013 -) in both Chemistry Department and Physics Department at National University of Singapore (NUS). He received his Bachelor's degree in Chemistry from Nanjing University (China) in 2001, Ph.D. degree from Chemistry Department at NUS in 2004 under the supervision of Prof Loh Kian Ping and Prof Andrew T. S. Wee. His current research interests include Molecular-scale Interface Engineering for Molecular, Organic and 2D Materials-based Electronics, and Interface-Controlled Nanocatalysis for Energy and Environmental Research. He has also published more than 200 papers on high-impact peer-reviewed journals in these topics, including 14 invited review articles, and receiving over 6000 citations with H-index of 41. Dr. Chen is a recipient of the Lee Kuan Yew Research Fellowship (2006), Omicron Nanotechnology Award (2009), Hitachi Research Fellowship (2010), Singapore Young Scientist Award (2012), and NUS Young Scientist Award (2013), NUS Dean's Chair Professor (2016).

Abstract:

The construction of long-range ordered organic donor-acceptor nanostructure arrays supported on solid substrates represents one of the most challenging tasks towards the realization of molecular nanodevices. They can also be used as ideal model systems to understand light induced charge transfer, charge separation and energy conversion processes and mechanisms at the nanometer scale. Molecular self-assembly on surfaces or surface nanotemplates via selective and directional covalent or non-covalent interactions offers a promising bottom-up approach to fabricating these molecular nanostructure arrays with desired functionalities over macroscopic areas. In this talk, I will highlight our recent progress in the fabrication of self-assembled molecular nanostructures on surfaces in ultrahigh vacuum, with particular emphasis on the role of intermolecular interactions in the self-assembly process. We describe the formation of tunable 2D binary molecular networks by directional and selective hydrogen bonding, as well as the templating effect of these 2D molecular networks, demonstrating the rational design and construction of long-range ordered 2D molecular nanostructures with desired functionality. We also demonstrate the reversible switching of single dipole molecule embedded in densely packed monolayer or hydrogen-bonded binary molecular networks on graphite, as well as single molecule response towards gas molecules.

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