The HKUST Energy Institute 香港科大能源研究院

EI Seminar

Van der Waals Heterostructures and Superlattices Beyond 2D Materials: the Bo(u)ndless Frontier

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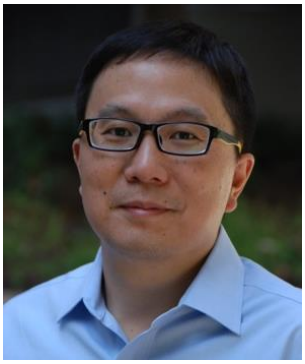
Date 19 December 2024 (Thursday)
Time 4 – 5 pm
Venue Room 5619, (near Lifts 31-32), HKUST, (**Location**)

Abstract

The rise of two-dimensional atomic crystals (2DACs) and van der Waals heterostructures (VDWHs) has inspired a bonding-free approach to constructing heterostructures beyond traditional epitaxial methods. This talk begins with an overview of early explorations into van der Waals (VDW) interactions for integrating disparate materials with pristine electronic interfaces. I will then focus on our recent advancements in synthesizing and exploring a diverse family of VDW superlattices (VDWSLs) composed of alternating layers of 2DACs and self-assembled molecular interlayers with customizable chemical compositions and structural motifs. I will highlight how these molecular interlayers can tailor the electronic and optical properties of 2DACs, with a particular emphasis on chiral molecular intercalation superlattices that exhibit robust chiral-induced spin selectivity and intriguing chiral superconductivity. With versatile molecular design and modular assembly strategies, 2D-molecular VDWSLs offer boundless opportunities to tailor electronic, optical, and quantum properties, creating a rich platform for emerging technologies.

About the Speaker



Dr. Xiangfeng Duan received his B.S. Degree from University of Science and Technology of China in 1997, and Ph.D. degree from Harvard University in 2002. From 2002-2008, he was a Founding Scientist responsible for advanced technology development at *Nanosys Inc*., a nanotechnology startup founded based partly on his doctoral research. Dr. Duan joined UCLA with a Howard Reiss Career Development Chair in 2008, and was promoted to Associate Professor in 2012 and Full Professor in 2013. His research interest includes nanoscale materials, devices and their applications in future electronics, energy and health technologies. Dr. Duan has received many awards for his pioneering research in nanoscale science and technology, including MIT Technology Review Top-100 Innovator Award, NIH Director's New Innovator Award, NSF Career Award, Alpha Chi Sigma Glen T. Seaborg Award, US Presidential Early Career Award for Scientists and Engineers (PECASE), ONR Young Investigator Award, DOE Early Career Scientist Award, Human Frontier Science Program Young Investigator Award, Dupont Young Professor, the Beilby Medal and Prize, International Society of Electrochemistry Zhao-Wu Tian Prize for Energy Electrochemistry, Materials Research Society Middle Career Researcher Award, IEEE Nanotechnology Council Distinguished Lectureship, the IEEE Pioneer Award in Nanotechnology, the Royal Society of Chemistry Materials Chemistry Horizon Prize (Stephanie L. Kwolek Prize) and Faraday Horizon Prize. He is currently a Fellow of Royal Society of Chemistry, American Association for the Advancement of Science and National Academy of Inventors.

All are Welcome