香港大學 機械工程系
Department of Mechanical Engineering
THE UNIVERSITY OF HONG KONG

SEMINAR

Title: Dynamic Control of Material Properties Using Solid-State Ionics for Next-Generation Microelectronics

Date: February 4, 2026 (Wednesday)

Time: 9:30am

Speaker: Dr. Mantao Huang
Assistant Professor
Artie McFerrin Department of Chemical Engineering
Texas A&M University
USA

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Abstract:
Advancing next-generation microelectronics demands materials that dynamically adapt their properties to address key challenges in energy-efficient computing, high-density memory, and intelligent sensing. My research explores the use of solid-state ionics, a platform for reversible ion insertion and transport, to develop material systems with dynamically programmable magnetic, optical, and electronic properties. This strategy enables the development of microelectronic components that go beyond static functionality, offering low power consumption and compatibility with scalable fabrication processes. In this talk, I will first discuss how reversible ion insertion can be used to dynamically control optical properties, enabling reflective displays and reconfigurable optical devices. Next, I will present my research on voltage-driven 180-degree magnetization reversal in ferrimagnetic materials, offering a highly efficient mechanism for spintronic memory and data storage. Finally, I will discuss the application of this ionic strategy in neuromorphic computing, through the development of three-terminal ionic synapses that emulate biological neural plasticity, enabling ultra-low-power artificial intelligence hardware accelerators. Together, these studies position solid-state ionics as a versatile platform for creating "materials that compute and adapt," with the potential to advance sustainable and high-performance microelectronics for an interconnected world.

Biography:
Dr. Mantao Huang is an Assistant Professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University. He holds a B.E. in Materials Science and Engineering from the Pennsylvania State University and a Ph.D. in Materials Science and Engineering from MIT. His research focuses on the dynamic control of material properties, including magnetic, optical, and electronic properties. He was awarded the Kavanaugh Translational Innovation Fellowship for his work translating laboratory discoveries into scalable solutions. He was also a SUTD-MIT Graduate Teaching Fellow.

ALL INTERESTED ARE WELCOME
For further information, please contact Prof. Mingxin Huang at mxhuang@hku.hk.