

UC San Diego

JACOBS SCHOOL OF ENGINEERING
Aiiiso Yufeng Li Family Department of
Chemical and Nano Engineering

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DEPARTMENT SEMINAR

Wednesday, April 23rd, 2025

11:00 AM - 12:00 PM

SME 248

Dr. Po-Chun Hsu, PhD

“Electrochemically Active Metasurfaces and Radiative Thermoregulating Materials for Human-Building-Energy Nexus”



Assistant Professor
Pritzker School of Molecular Engineering
University of Chicago

Abstract: Global warming is essentially an optothermal problem which the balance between solar heat gain and radiative heat loss is changed by the greenhouse gas emission. Immense opportunities for energy and sustainability lie in understanding and manipulating materials' optical properties, which can originate from multiple length scales, from free charge carriers and the bound vibrational mode to nanocavity resonances. Meanwhile, electrochemistry is a powerful tuning knob for inducing drastic optical property change, varying the carrier density or even trigger a phase transformation in an electrically addressable manner, which is particularly desirable in many energy and sustainability applications where tunable range, scalability, and non-volatility are crucial. Integrating with metasurface concepts will provide additional degrees of freedom to boost performance and achieve multifunctional control. In this talk, I will present our research group's recent progress in three aspects: (i) Wearable photon-engineered textile for multispectral and multifunctional radiative heating and cooling. (ii) High-metallicity electrochromic polyaniline for near-perfect dynamic thermal meta-emitter. (iii) Reversible metal electrodeposition for solar and mid-infrared control for all-year-round renewable thermoregulation for net-zero-energy buildings.

Bio: Po-Chun Hsu is an Assistant Professor at the Pritzker School of Molecular Engineering at the University of Chicago, focusing on light- and heat-managing materials for energy, sustainability, and health. He earned his PhD in Materials Science and Engineering and was a postdoctoral researcher in Mechanical Engineering, both at Stanford University. Before joining the University of Chicago, he was an Assistant Professor of Mechanical Engineering and Materials Science at Duke University from 2019 to 2022. He is a recipient of the NSF CAREER Award, shortlist for the Falling Walls Science Breakthrough of the Year 2023, EcoMat Young Researcher Award, Ralph E. Powe Junior Faculty Enhancement Awards, MIT Technology Review Innovators Under 35 (China), Clarivate Analytics Highly Cited Researchers, and Sony Faculty Innovation Award. His project in cooling textiles was selected as Top Ten World-Changing Ideas by Scientific American.

Seminar Host: Zeinab Jahed