



Department of  
Mechanical Engineering  
The University of Hong Kong

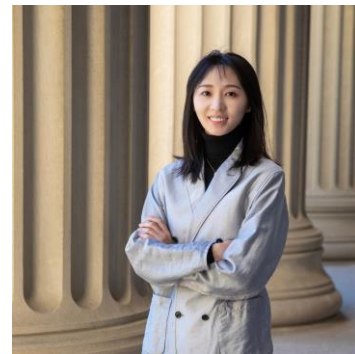


## SEMINAR

### METER-SCALE VERTICAL HYDROGEL PANEL FOR ATMOSPHERIC WATER HARVESTING UNDER EXTREME CONDITIONS

**Date:** December 12, 2024 (Thursday)  
**Time:** 10:00 am – 11:00 am (Hong Kong Time)  
**Venue:** Room CPD-2.45  
Centennial Campus, HKU

**Speaker:** Professor Will Chang Liu  
Department of Mechanical Engineering at  
the National University of Singapore  
(Starting Jan 2025)



#### Abstract:

In response to the global challenge of water scarcity, especially in off-grid, landlocked, and arid regions, our study introduces a new atmospheric water harvesting (AWH) technology using super-stable hygroscopic hydrogel vertical panels. The AWH system absorbs atmospheric moisture during the night and releases it through evaporation and recondensation during the day, completing the water collection cycle without electricity. To address the long-standing challenges of hygroscopic hydrogels, such as ineffectiveness at low relative humidity with increased sample dimensions and potential water contamination from  $\text{Li}^+$ , we designed hydrogels at the molecular level. These hydrogels consist of poly(vinyl alcohol) matrices embedded with lithium chloride as the hygroscopic agent, alongside a non-volatile additive that ensures stability and efficiency in water uptake, enabling the structural design of vertical origami array panels. Notably, our AWH system achieves daily water production an order of magnitude higher than current state-of-the-art methods, while keeping  $\text{Li}^+$  contamination below 0.06 ppm. Additionally, it is engineered for climate adaptability, operating efficiently across a wide range of relative humidity levels, from as low as 18% to over 90%. A field test conducted in the extreme conditions of Death Valley further demonstrated the robustness and effectiveness of this system, showcasing its potential for deployment in some of the world's harshest environments.

## **Biography:**

Dr. Will Chang Liu  
Assistant Professor

Dr. Will Chang Liu has been serving as an Assistant Professor in the Sustainable Energy and Environment Thrust at the Hong Kong University of Science and Technology (Guangzhou) since December, 2023. Dr. Liu will soon join the Department of Mechanical Engineering at the National University of Singapore.

She obtained her Bachelor's degree in Mechanical Engineering from the Hong Kong Polytechnic University (PolyU) and subsequently received her Doctor of Philosophy in Mechanical Engineering from the University of Hong Kong (HKU). During her postdoctoral research, she worked with Professors Nicholas X. Fang and Xuanhe Zhao at the Massachusetts Institute of Technology (MIT).

Dr. Liu has been dedicated to the development of intelligent soft materials and innovative green energy devices, with a focus on applications in energy harvesting, energy saving, and water harvesting. She has published 22 academic papers in internationally renowned journals such as *Joule*, *Energy & Environmental Science*, *Nature Communications*, *Nano Energy*, and *PNAS*, with a total of over 1,000 citations.

**ALL INTERESTED ARE WELCOME**

**For further information, please contact Prof. Nicholas Fang at 3917 2639.**