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

SEMINAR

Title: **De Novo Design of Controllable and Functional Self-assembling Protein Filament Biomaterials**

Date: **December 29, 2025 (Monday)**
Time: **9:30 am**
Venue: **Room 7-34/35, Haking Wong Building**
HKU

Speaker: **Dr. Hao Shen**
Postdoctoral Scientist
Institute for Protein Design & HHMI
University of Washington
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Abstract:

I have been dedicated to the de novo design of self-assembling protein filaments for a decade. I began with single-component fibers featuring defined structures, tunable diameters, and dynamic assembly. By continually advancing our methodology, I now design multi-component, ligand-induced, environmentally responsive, and nucleation-controlled protein filaments up to 10 μm in length with high rigidity. In parallel, I have created functional protein fibers for applications including conductive nanowires, fibers with energy-transferable ligands, and fibers that bind carbon nanotubes or exhibit designed fluorescence.

With the ability to program functional proteins into helical filament assemblies, I am deeply interested in developing protein-fiber-based nanomachines such as nanoscale walkers and self-assembling smart materials. Controlled assembly can serve as a signal-amplification platform for diagnostics. The defined filament architectures enable scaffolding of proteins of interest for cryo-EM structure determination. These filaments also interface with inorganic materials to create complex hybrid systems. Beyond biotechnological applications, precisely designed helical filaments offer significant opportunities to study molecular self-assembly mechanisms and their interactions with cellular biology through in vivo assembly.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. Mingxin Huang at 39177906.