Department of
Mechanical Engineering
The University of Hong Kong

DEPARTMENT OF
MECHANICAL ENGINEERING
THE UNIVERSITY OF HONG KONG

SEMINAR

Title: **Molecular Design of Tissue/Cell Mimicking Materials for Immunomodulation**

Speaker: **Dr. Junzhe Lou**

Postdoctoral Fellow

Harvard University

USA

Date: **March 3, 2025**

Time: **9:30am**

Join Zoom Meeting
https://hku.zoom.us/j/95971576983?pwd=cs3PJqk8qzOV4VMa8orT4HCVkJ7wSa.1

Meeting ID: **959 7157 6983**
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Abstract:

Immunomodulation that regulates biological functions of various components in the immune system to achieve effective therapeutic outcomes are promising strategies to resolve many health problems. Biomimetic materials that recapitulate the key features of biological systems provide powerful therapeutic tools to engage with and modulate the immune systems. However, rational design of tissue/cell mimicking materials with tunable functionalities to address specific therapeutic needs remain challenging. In this talk, I will

focus on how we precisely engineer biomimetic materials capable of regulating immune cell functions for therapeutics by leveraging innovative molecular approaches. In the first part, I will describe how we systematically engineer cell-mimicking materials to activate T cells for cell-based immunotherapy. We develop a new class of microgel-based artificial cells that allow efficient activation and expansion of T cells, and demonstrate how we can regulate T cell phenotypes and functions by modulating different biochemical and mechanical properties of these materials. In the second part, I will talk about the bottom-up molecular design to precisely engineer polymeric hydrogels that recapitulate the viscoelastic mechanical property of biological systems. We develop a quantitative understanding of the molecular mechanisms to modulate hydrogel viscoelasticity, and explore the use of these materials as 3D scaffolds for cell culture and cell delivery. Together, these studies highlight how precise engineering of tissue/cell mimicking materials via molecular-level control can open up new avenues for immunomodulation to tackle human health challenges.

Biography:

Dr. Junzhe Lou is currently a postdoctoral scholar at Harvard University John A. Paulson School of Engineering and Applied Sciences in the laboratory of Prof. David Mooney. His postdoc research focuses on engineering artificial cells and tissues for immunotherapy and regeneration. He received his Ph.D. (2019) and M.S. (2016) in Materials Science and Engineering from Stanford University under the guidance of Prof. Yan Xia, where he leveraged molecular strategies to design and understand polymeric materials that recapitulate key biological features. He obtained his B.S. degree in Polymer Materials and Engineering at Zhejiang University in 2013. For his research, Dr. Lou has been recognized with numerous awards, including ACS PMSE Future Faculty Scholar and MRS Graduate Student Award.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. Mingxin Huang