Department of Materials Science and Engineering Seminar Series 2023

Additive Manufacturing of Functional Hydrogel-Elastomer for Water Harvesting and Sensing Application

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23 June 2023, Friday at 02:00 PM

Zoom:
https://nus-sg.zoom.us/j/83209145516?pwd=YmF4elNDSWVMY3VoYTlZL3VxT3o5UT09

Meeting ID: 832 0914 5516
Passcode: 948649

Abstract

Hydrogels, known for their high absorbency and flexibility, have diverse healthcare and consumer product applications. However, their water sensitivity and complex manufacturing processes pose challenges. To overcome these limitations, researchers have explored the combination of hydrogels with elastomers, stretchable polymers that retain their shape. This integration improves properties such as conductivity and printability. Despite their advantages, hydrogel-elastomer hybrids may exhibit weaknesses, including substrate-material compatibility and insufficient bonding, affecting mechanical performance.

This thesis investigates the development and applications of hydrogel-elastomer hybrids using additive manufacturing. The first chapter addresses water scarcity, highlighting the potential of these hybrids for conservation. The following chapter delves into the electrical and chemical characteristics, emphasizing their usage in sensing and energy applications, as well as their design and optimization for water harvesting. The last chapter presents a stimuli-

responsive hydrogel for water desalination and the preparation of a printable conductive elastomer for potential use as a movement and temperature sensor.
This research contributes to the development of functional materials through additive manufacturing, enabling the fabrication of enhanced hydrogel-elastomer hybrids for diverse applications.

Biography

Firoozeh holds a B.Eng. and an M.Eng. degree in Material Science and Engineering. She is currently pursuing her Ph.D. under the supervision of Prof. Ding Jun, with a research focus on Additive Manufacturing, specifically vat photopolymerization-based 3D printing.
Her current research centers around the development of stretchable hydrogel-elastomer materials for a diverse range of applications, including atmospheric water harvesting, as well as the fabrication of movement and temperature sensors. Through her work, Firoozeh aims to contribute to advancing Additive Manufacturing techniques and their potential to create functional materials for various fields.

Please join us!

HOST: Prof. Xue Jun Min