

DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

WILLIAM MAXWELL REED SEMINAR SERIES

“Additive Manufacturing: Future of Healthcare”

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Abstract:

Personalized medicine as an emerging solution for health problems is leveraged by advanced manufacturing technologies. Personalized medical devices, tissue grafts, biomonitoring systems, and precision medicine are customized based on each patient’s needs and health background. However, the current manufacturing techniques are challenged when it comes to fabricating architected structures with complex designs. Additive manufacturing has been a strong tool for fabricating such architectures for tissue regenerative applications. In combination with sacrificial biomanufacturing, functional living materials are developed with 3D internal permeable macrochannels that enable nutrition transfer for prolonged cell viability. Conventional approaches for implantation of fully functional 3D printed tissue constructs require invasive surgeries, raising the need for more efficient alternative biomanufacturing technologies. Sound *in vivo* printing is a unique solution that enables printing tissue scaffolds deep inside the body where in lieu of open surgeries, the target organs can be reached through minimally invasive devices such as catheters to deliver biomaterials. For this purpose, focused ultrasound-triggered crosslinking is used for creating complex biostructures centimeters deep into the organs. Next-generation *in vivo* printing technology enables a smart biomanufacturing scheme for a wide range of functional biomaterials for applications in tissue regeneration, bioelectronics, drug delivery, *etc.*

Speaker Bio:



Elham Davoodi is an NIH T32 postdoctoral fellow at the California Institute of Technology (Caltech). She received her Ph.D. in Mechanical Engineering from the University of Waterloo in 2021 and was a visiting graduate researcher at the University of California, Los Angeles (UCLA). Her research is focused on the applications of additive manufacturing in healthcare by addressing the current challenges in process and design. In her current research, she develops advanced additive manufacturing technologies for minimally invasive therapies and personalized medicine. She has published over 25 peer-reviewed papers in prestigious journals such as *ACS Nano*, *Bioactive Materials*, *Chemical Reviews*, *Additive Manufacturing*, and *Advanced Healthcare Materials*. In her career, she received WIN Nanofellowship from the Waterloo Institute of Nanotechnology in 2020 and has been named a Rising Star in Mechanical Engineering by Stanford University in 2022 and University of Tokyo in 2023.

Date: Friday, January 12, 2024
Place: Whitehall Classroom Building 110

Time: 3:00 PM EST
Contact: Dr. Jonathan Wenk

Attendance open to all interested persons