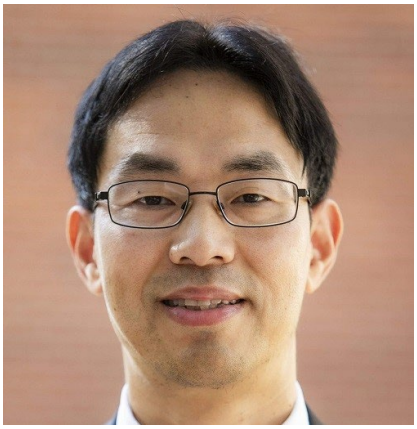
Upcoming Seminar

Bioprinting: Implementation, Process Dynamics, and Process-Induced Cell Injury



Dr. Yong Huang, Professor

Mechanical and Aerospace Engineering, Biomedical Engineering and Materials Science Engineering

Maskless (including extrusion-, laser-, and inkjet-based) three-dimensional (3D) cell bioprinting is a revolutionary advance for printing arbitrary cellular patterns as well as creating heterogeneous living constructs. More importantly, bioprinting provides a promising solution to the problem of organ donor shortage by providing printed tissue/organ constructs for transplantation, resulting in what is known as organ printing. While there are various technological advances for bioprinting, cell-laden viscoelastic fluid printing and printing-induced cell injury still pose significant challenges to ensuring the scale-up of robust bioprinting. Using laser bioprinting (laser-induced forward transfer) and inkjet bioprinting as two jet-based model printing systems, we have been studying the bioink jettability and printability as well as printing-induced cell injury problems, aiming to achieve robotic bioprinting. In this talk, the perspective of ongoing bioprinting research and various bioprinting technologies are first introduced. Then the jettability and printability of cell-laden viscoelastic bioinks are discussed using the dimensionless Ohnesorge and elasto-capillary numbers to capture the influence of material properties along with the Weber number to capture the influence of printing conditions. Furthermore, the modeling of laser-induced cellular droplet formation and landing processes is presented, and the relationship between the mechanical loading information and post-transfer cell injury/viability is established using an apoptosis signaling pathway-based modeling approach. Finally, this talk shares some thoughts regarding bioprinting-related basic scientific challenges.

About Dr. Yong Huang

His research interests are two-fold: 1) processing of biological and engineering materials for healthcare/energy applications, and 2) understanding of dynamic material behavior during manufacturing and process-induced damage or defect structures. His current research topics include design and fabrication of microphysiological systems, manufacture of substance-encapsulated polymeric microgels/microspheres/microcapsules, and three-dimensional (3D) printing of biological and engineering structures from difficult-to-print ink materials using inkjetting, extrusion, and laser-induced forward transfer.

Thursday

December 9, 2021

3:00pm

Location: Frazier Rogers Hall Room 122 and Zoom

Zoom Registration Required at:

tinyurl.com/9fa7kkuc

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