

Johns Hopkins University, Department of Mechanical Engineering
2020 Fall Virtual Seminar Series: Class 530.803

Thursday, September 17, 2020 | 3:00 PM via Zoom

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“Rapid 3D Bioprinting for Regenerative Medicine: A Mechanical Engineer’s Perspectives”

Presented by [Shaochen Chen, Ph.D.](#)

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In this talk, I will present our laboratory’s recent research efforts in developing rapid 3D bioprinting methods to create 3D tissue constructs using a variety of biomaterials and cells. These 3D printed scaffolds are functionalized with precise control of micro-architecture, mechanical (e.g. stiffness), chemical, and biological properties [1]. Such functional scaffolds allow us to investigate cell-microenvironment interactions at nano- and micro-scales in response to integrated mechanical and chemical stimuli. From these fundamental studies we have been creating both *in vitro* and *in vivo* precision tissues for tissue regeneration, disease modeling, and drug discovery [2, 3]. Examples including 3D bioprinted liver and heart models will be discussed. I will also showcase 3D printed biomimetic scaffolds for treating spinal cord injury. Throughout the presentation, I will discuss mechanical engineer’s perspectives in terms of design innovation, biomaterials, mechanics, and scalable manufacturing.

1. Yu C, Ma X, Zhu W, Wang P, Miller K, Stupin J, Koroleva-Maharajh A, Hairadedian A, **Chen S**, “Scanningless and continuous 3D bioprinting of human tissues with decellularized extracellular matrix”, *Biomaterials*, Vol. 194, pp 1-13, 2019
2. Ma X, Qu X, Zhu W, Li Y, Yuan S, Zhang H, Liu J, Wang P, Lai C, Zanella F, Feng G, Sheikh F, Chien S, **Chen S**, “A Deterministically Patterned Biomimetic Human iPSC-derived Hepatic Model via Rapid 3D Bioprinting”, *Proceedings of the National Academy of Sciences (PNAS)*, 2016, Vol. 113 (no. 8), pp. 2206-2211, 2016.
3. Koffler J, Zhu W, Qu X, Platoshyn O, Dulin J, Brock J, Graham L, Lu P, Sakamoto J, Marsala M, **Chen S**, Tuszynski M, “Biomimetic 3D Printed Scaffolds for Spinal Cord Injury”, *Nature Medicine*, Vol.25, pp.263-269, 2019.



Dr. Shaochen Chen is a Professor and Chair in the NanoEngineering Department and Professor in the Bioengineering Department at the University of California, San Diego (UCSD). He is the founding co-director of the Biomaterials and Tissue Engineering Center at UCSD. Before joining UCSD, Dr. Chen had been a Professor and a Henderson Centennial Endowed Faculty Fellow in Engineering at the University of Texas at Austin from 2001 to 2010. Between 2008 and 2010, he served as the Program Director for the Nanomanufacturing Program of the National Science Foundation (NSF). Dr. Chen’s primary research interests include: 3D printing and bioprinting, biomaterials and nanomaterials, stem cell and regenerative medicine, tissue engineering. He has published over 160 papers in top journals. Among his numerous awards, Dr. Chen received the NSF CAREER award, ONR Young Investigator award, and NIH Edward Nagy New Investigator Award. He also received the Milton C. Shaw Manufacturing Research Medal from ASME for his seminal work in 3D printing, bioprinting, and nanomanufacturing. Dr. Chen is a Fellow of AAAS, AIMBE, ASME, SPIE, and ISNM.

Department of Mechanical Engineering

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