

Nano and Microscale Light-based 3D Bioprinting for Tissue Engineering and Regenerative Medicine

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Abstract

In this talk, I will present our laboratory's recent research efforts in developing micro and nano-scale 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. 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. 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 engineer's perspectives in terms of design innovation, biomaterials, mechanics, and scalable biomanufacturing.