

3D Bioprinting for *in vitro* Tissue Engineering

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Abstract

3D Bio-Printing uses living cells to build *in vitro* physiological models. The printed tissue models have been widely applied to regenerative medicine, studying disease pathogenesis, developing molecular therapeutics, and screening drugs. This presentation will review the basic principle of cell printing and report our recent study on printing *in vitro* tissue models for regenerative medicine, disease study and drug testing. An overview of a cell printing process and enabling printing techniques will be introduced, followed by examples of printing different tissue models for tissue engineering and drug testing, including printing ESCs for formation of embryonic body, printing hiPSC cells for hepatocyte differentiation and integration with microfluidics for drug testing, printing neuron cells to construct *in vitro* neural network and studying DNQX influence, and printing cancer (Hela) cells to build 3D *in vitro* tumor models for studying chemoresistance and expressions of genes and tumor markers. Comparison of biological data derived from 3D printed models with 2D planar models in petri-dishes will be given wherever appropriate. A personal opinion on challenges and opportunities of 3D bio-printing will also be shared.

Biography

Wei Sun, Albert Soffa Chair Professor of Mechanical Engineering, Drexel University, and National “Thousand-Talent” Distinguished Professor and Director of Biomanufacturing Center, Tsinghua University, China. Dr. Sun’s research has been on Biofabrication, 3D Bio-Printing, and Tissue Engineering. Dr. Sun’s research has been funded by NSF, DARPA, NASA, the Chinese Natural Science Foundation, the Chinese Ministry of Science and Technology, and the Chinese Ministry of Education. Dr. Sun has published over 150+ peer-reviewed journal papers with 9100+ SCI citations, 70+ patent applications, and 350+ invited presentations in the field of his research. Dr. Sun is the Founding President for International Society of Biofabrication (2010-2014), and the Founding Editor-in-Chief for journal Biofabrication (2009-present). Dr. Sun received Award of Distinguished Visiting Fellow from the Royal Academy of Engineering, UK (2018), the Senior Investigator Award from International Society of Biofabrication (2017), and MII / Fralin Visiting Scholar Award from Virginia Tech (2015).

