BIOBONE

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Bioactive Microfibers for Tissue Engineering and Regenerative Medicine

Abstract: Engineering tissues and organs for implantation in the human body or research require the fabrication of constructs that reproduce a physiological environment. Moreover, the construction of complex and sizable three-dimensional tissues requires a precise control over cell distribution and an effective vasculature network to supply oxygen and nutrients, and remove waste. Fiber-based tissue engineering that forms 3D structures using fibers can address many of these challenges, but depends on the quality of the fibers. Recent progresses in microtechnologies have enabled researchers to fabricate biocompatible fibers with advanced biochemical and physical properties, including cell-laden fibers that are pre-seeded with cells. In this talk, I will outline my work in creating bioactive microfibers using microtechnologies. In the first part of my talk, I will discuss a novel microfluidic spinning platform that enables fabricating microfibers from a wide range of biomaterials. Second part of my talk is devoted to composite living fibers with superior mechanical properties and their use in fabricating tissue constructs using textile methods. In the last part, the application of bioactive fibers in creating tissue constructs, smart wound dressings, and wearable diagnostic devices will be explored.

Bio: Dr. Mohsen Akbari is an assistant professor of Mechanical Engineering at University of Victoria, Canada and research scholar at Harvard-MIT Division of Health Sciences. He is also affiliated with Harvard Medical School, Brigham and women's hospital in the US. Dr. Akbari has 21 peer-reviewed articles in high impact journals such as Biotechnology Advances, Advanced Materials, Advanced Healthcare Materials, and, Microfluidics & Nanofluidics, two book chapters, one provisional patent, two lab-on-chip research highlights, and 18 articles and posters in prestigious conferences such as µTAS and IMECE, and ASME. Dr. Akbari is the recipient of several institutional, national, and international awards such as the British Columbia Innovation award (success rate of <5%), the Natural Sciences and Engineering Research Council of Canada (NSERC) postdoctoral fellowship (success rate of <10%), and Kaisar Foundation award (success rate: 1 per year per institution). Recently, he has been recognized as a Canadian rising star in global health (success rate <5%) and received $100k to develop a low cost thermal cycler for detection of tuberculosis in low-income countries.