NJIT New Jersey Institute of Technology

BME

Department of Biomedical Engineering

Graduate Seminar

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Subject: Microscale Sensors and Systems for Tissue Engineering and Regenerative Medicine Applications

Abstract:

Tissue engineered constructs and organ on chip platforms are emerging platforms for drug screening applications. The use of three-dimensional constructs created using human cells can potentially be used to obtain human patient responses to particular drugs and may serve as complementary alternatives to animal studies. Moreover, in order to have realistic models of in vitro human organ constructs, the physical and biochemical environments of the tissue constructs need to be monitored and validated with conditions akin to in vivo environments. As such there is an unmet need to develop microfluidic bioreactors or organs on a chip systems with integrated sensors which will provide information about the physical parameters such as pH, osmolarity, temperature, etc as well as the metabolic activity of cultured cells. Cell secreted biomarkers could be utilized to monitor the functionality of cells. The sensor systems are intended for continuous monitoring of the tissue environments for up to several weeks. Another area for niche applications of miniature sensors are in wound monitoring. Specifically, chronic wounds of diabetic patients can be monitored using flexible sensors and if needed the wound could be intervened so as to prevent infection or further complications. In this talk, I will present two examples of sensor systems, (i) a smart bandage for wound monitoring, (ii) miniature physical and biochemical sensors for monitoring microfluidic organ constructs.

Bio:

Mehmet R. Dokmeci received B.S. (with distinction) and M.S. degrees from the University of Minnesota, Minneapolis and the Ph.D. degree from the University of Michigan, Ann Arbor, all in Electrical Engineering. Dr. Dokmeci is an Associate Professor at the Terasaki Institute for Biomedical Innovation (TIBI) since July 2020. He was previously an Associate Adjunct Professor in the Radiology Department at University of California-Los Angeles from November 2017 to June 2020. He was a former Instructor at Brigham and Women's Hospital, Harvard Medical School, a position he has held for 7 years. Previously, he was on the faculty of the Electrical and Computer Engineering Department at Northeastern University. Before joining academia, he had 4 years of industrial experience at Corning-Intellisense Corporation, Wilmington, MA, developing MEMS-based products for the telecommunications and life science industries from 2000 to 2003. He has served as the program organizer and chair for many conferences, such as organizer and chair of the 31st Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBS Technical Committee on Bio-Micro-Electro-Mechanical Systems (TC-BioMEMS) and Session Chair of Society of Experimental Mechanics Annual Conference, Springfield. He has extensively published in refereed journals and conferences in the areas of MEMS, Micro- and Nanotechnology, and Biochemistry. He is also a long-term member in the Institute of

Electrical and Electronics Engineers (IEEE), Materials Research Society (MRS), American Chemical Society (ACS) and American Association for the Advancement of Science (AAAS). He has a strong background and more than a decade of experience in designing and fabricating micro and nanoscale sensors and systems, biomedical devices, tissue engineering and implantable biosensors. He has been actively involved in research areas such as flexible electronics for monitoring and modulation of wound healing, electrical/electrochemical biosensors and microfluidic systems for organs-on-a-chip applications and 3D bioprinting. He has authored more than 156 journal papers, 4 book chapters; 5 patents/disclosures; 112 conference publications/abstracts, has an h-index=64, citations > 15,200.

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