Department of
Biomedical Engineering
UNIVERSITY OF WISCONSIN-MADISON

Spring 2018 Corrine Bahr Memorial Lecture

Nano- and Microfabricated Hydrogels for Regenerative Engineering

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Engineered materials that integrate advances in polymer chemistry, nanotechnology, and biological sciences have the potential to create powerful medical therapies. Our group aims to engineer tissue regenerative therapies using water-containing polymer networks (called hydrogels) that can regulate cell behavior. Specifically, we have developed photocrosslinkable hybrid hydrogels that combine natural biomolecules with nanoparticles to regulate the chemical, biological, mechanical and electrical properties of gels.

These functional scaffolds induce the differentiation of stem cells to desired cell types and direct the formation of vascularized heart or bone tissues. Since tissue function is highly dependent on architecture, we have also used microfabrication methods, such as microfluidics, photolithography, bioprinting, and molding, to regulate the architecture of these materials. We have employed these strategies to generate miniaturized tissues. To create tissue complexity, we have also developed directed assembly techniques to compile small tissue modules into larger constructs. It is anticipated that such approaches will lead to the development of next-generation regenerative therapeutics and biomedical devices.

ABOUT the SPEAKER

Ali Khademhosseini received his Ph.D. in bioengineering from MIT in 2005 under the supervision of Professor Robert Langer. He then began his independent career at Harvard University where he rose to Professor at Harvard Medical School (HMS) and faculty at the Harvard-MIT's Division of Health Sciences and Technology (HST), Brigham and Women's Hospital (BWH) and as well as associate faculty at the Wyss Institute for Biologically Inspired Engineering. As of November 2017, he is the Levi Knight Professor of Bioengineering, Chemical Engineering and Radiology at the University of California-Los Angeles (UCLA). He is the Founding Director of the Center for Minimally Invasive Therapeutics at UCLA as well as an Associate Director of the California NanoSystems Insitute. He is a leader in applying bioengineering solutions to precision medicine. His large and interdisciplinary group is interested in developing 'personalized' solutions that utilize micro- and nanoscale technologies to enable a range of therapies for organ failure, cardiovascular disease and cancer. He has edited multiple books / journal special issues and is an author on >500 peer-reviewed journal articles, editorials and review papers, >60 book chapters/edited books and >20 patent/disclosure applications. His work has been published in leading journals and routinely highlighted in international media. Dr. Khademhosseini is an Associate Editor for ACS Nano. He has been cited >38,000 times and has an H-index of 99.

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