



Thursday, March 19th, 2015, 5:00 P.M.

Room No. 109, DASAN bldg. 1st Floor

(Host: Prof. Chung, Euiheon / Language: English)

Multi-Scale Biofabrication Strategies for Cancer Biology, Stem Cell and Tissue Engineering

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Living tissues are intricate ensembles of multiple cell types embedded in a complex, well-defined extracellular environment. In this talk, I will present our multi-scale biofabrication strategies for engineering biomaterials-based complex cellular and multi-cellular microenvironments. Inspired by ultrastructural analysis of native tissue microenvironments, I will particularly focus on three different settings in normal and disease contexts, in which controlling cell-material interactions at the nanoscale can have dramatic consequences: tumor progression and metastasis, stem cell differentiation, and cardiac/skeletal muscle tissue engineering. As novel approaches to address these problems, I will introduce scalable, nanotopographically-controlled cell and tissue culture models developed in our laboratory, including a structurally defined tumor invasion model, nanopatterned muscle cell patches, and a drug-induced cardiotoxicity screening assay. Using these biofabricated tools in combination with human pluripotent stem cell technologies, I will highlight how our biomimetic tissue models helps to gain a better understanding of the structure-function relationship in complex 3D tissues, and serve as emerging platforms for regenerative cell therapy, disease modeling, and drug screening. We propose that controlling cell-material interactions at the nanoscale can stipulate structure and function on the tissue level, and yield novel insights into in vivo tissue physiology, while providing scaffolding materials for improved tissue repair.

Biosketch

Dr. Deok-Ho Kim is currently an Assistant Professor in the Department of Bioengineering at the University of Washington. He received his Ph.D. degree in Biomedical Engineering from the Johns Hopkins University School of Medicine in 2010. His research interests include development and application of advanced biomaterials and micro/nano-technologies for studying cell-matrix mechanobiology, stem cells and tissue engineering. He has authored or co-authored more than 120 peer-reviewed journal and conference papers, 2 books, 10 book chapters, and has 19 patents issued or pending. Among the awards he has received are the Samsung Humantech Thesis Award (2009), the Harold M. Weintraub Award in Biological Sciences (2010), the Perkins Coie Award for Discovery (2011), the American Heart Association National Scientist Development Award (2012), the Springer Award for Most Downloaded and Most Cited Review Article from *Annals of Biomedical Engineering* (2013), the BMES-CMBE Rising Star Award (2013), and the BMES-CMBE Young Innovator Award (2015). Dr. Kim is currently an Associate Editor for *Biomedical Microdevices* and *IEEE Transactions on NanoBioscience*, and serves as a member of the editorial boards of numerous journals including *Scientific Reports*, *Theranostics*, *International Journal of Nanomedicine*, *IET Nanobiotechnology*, and *Journal of Laboratory Automation*. <http://www.openwetware.org/wiki/Kim>