



Ehsan Jabbarzadeh

Department of Chemical Engineering
University of South Carolina
3C19 Swearingen Engineering Center
Columbia, SC 29208

<http://www.che.sc.edu/~jabbarzadeh>

Seminar Series: MAE Seminar, 2015 spring quarter

Date and Time: 04/17/2015 - 10:30am - 11:30am,

Location: MDEA, #311 on the [UCI Campus Map](#)

Hosted by: Prof. Arash Kheradvar (arashkh@uci.edu)

Title: Bioinspired Nanomatrix Platforms for Dynamic Programming of Stem Cells

Abstract

The field of tissue engineering has evolved to develop functional substitutes for damaged tissues using combinations of cells, scaffolding materials and signaling molecules. Despite great promise, there exist important challenges to creating off-the-shelf engineered tissues. One important hurdle is our insufficient understanding of the molecular mechanisms associated with cell-extracellular matrix interactions. Another challenge lies in the development of biomaterials that not only mimic the structure of natural tissues but also allow for the formation and infiltration of blood vessels. To address these challenges, we have taken an integrated approach with three components. The first component of our work included the control of host macrophage phenotype through natural and physiological interventions to switch pro-inflammatory behavior to a pro-angiogenic phenotype. The second component of our research dealt with understanding the underlying mechanisms by which stem cells sense and respond to external microenvironmental cues. In this context, we engineered platforms capable of parsing the combinatorial effects of matrix elasticity, cell shape, and cell size on lineage specification of stem cells. The third component of our work focused on development of no-viral gene delivery carriers based on the use of carbon nanotubes with tunable chemistry and gene release profile to control cellular fate at the intercellular level. I will discuss how our findings advance the current understanding of the complex mechanisms behind tissue formation in biomaterials and cell-material interactions and provide potential design strategies for regenerative medicine.

Speaker's Bio

Ehsan Jabbarzadeh is an Assistant Professor of Chemical Engineering Department and Biomedical Engineering Program at the University of South Carolina. He completed his PhD at Drexel University in 2007 under the supervision of Cato T. Laurencin and Cameron Abrams focusing on the development of strategies to vascularize bone grafts. Prior to his current appointment, he completed a 2 year postdoc under the supervision of Mory Gharib and Anand Asthagiri at the California Institute of technology. He has published over 20 peer-reviewed papers in the fields of tissue engineering and regenerative medicine. In recognition of his work, he has received the Drexel Best Doctoral Dissertation Award and University of South Carolina Promising Young Investigator Award. He currently mentors 1 postdoctoral scholar, 1 orthopaedic resident researcher and 3 Ph.D. students in the lab.