JOHNS HOPKINS
BIOMEDICAL ENGINEERING

Monday April 27, 2009, 1:00 PM, Rome Room, Clark 110
(Homewood Campus)
Light lunch will be provided at 12:15

"Manipulating Biomaterial Properties to Control Cellular Interactions and Molecule Delivery"

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Hosted by Dr. Jennifer Elisseeff

Abstract Photopolymerization is a process that is finding many applications in the fabrication of biomaterials for drug delivery, in the design of microdevices, and especially for the regeneration of tissues. Through the addition of a photoinitiator and an initiating light source, liquid solutions containing multifunctional monomers solidify into crosslinked networks. The widespread application of this process has been motivated by the spatial and temporal control that is afforded during photoinitiated polymerizations. Of particular interest to our laboratory is designing hydrogels with controlled properties that can influence the behavior of cells that interact with the material. Others have shown the importance of material chemistry and mechanics on the differentiation and behavior of encapsulated stems cells. Our work is motivated by the use of mesenchymal stem cells (MSCs) towards the regeneration of a wide range of tissues. Towards cartilage regeneration, we have been designing hydrogels based on hyaluronic acid (HA) that interact with cells via surface receptors (e.g., CD44) and degrade via hyaluronidases. To enhance the control over network temporal properties, we recently synthesized a novel HA macromer with hydrolytically degradable groups between the backbone and reactive groups. When polymerized, this hydrogel degrades via both enzymatic and hydrolytic mechanisms and can be used for control over growth factor delivery and ECM distribution. We are able to spatially control hydrogel properties with the use of multiple modes of crosslinking. Additionally, we have been developing a novel class of biodegradable materials and are investigating their use for tissue regeneration through the fabrication of electrospun scaffolds. We have been exploring techniques to influence porosity throughout the scaffolds to enhance cellular infiltration.

Upcoming Seminars
May 11: Gaudenz Danuser, Scripps

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