

MSE SEMINAR

April 6, 2018

113 McBryde Hall

3:30 – 4:30 PM

Refreshments at 3:00 PM

Nicholas Chartrain

Graduate Student

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“Developing New Materials for 3D Printing to Investigate the Effects of Tissue Scaffold Geometry on Cell Response”

ABSTRACT

Mask Projection Microstereolithography (MP μ SL) is an Additive Manufacturing (3D Printing) technique capable of fabricating complex geometries with micron-sized features. This makes MP μ SL well suited for the fabrication of tissue scaffolds for use in tissue engineering applications. Although few materials compatible with MP μ SL that are biocompatible and encourage cell attachment, we have developed a new photopolymer resin composition that fulfills these requirements and, unlike other materials reported in the literature, requires no synthesis as it can be readily made from off the shelf reagents. In addition, the coupling of a manufacturing technique with geometric flexibility not afforded by conventional scaffold fabrication techniques and new biocompatible materials permits the fabrication of scaffolds that will allow researchers to understand effects of scaffold geometry on cells. Scaffold pore size is an important parameter in cell viability and proliferation, but it is difficult to isolate the effects of pore size from those of pore shape, permeability, vascular networks, and other scaffold features. This work aims to isolate the effects of pore size on cell proliferation while maintaining constant other scaffold parameters (e.g. porosity, pore shape) by fabricating scaffolds with MP μ SL.

BIOSKETCH

Nicholas Chartrain is a Ph.D. candidate coadvised by Dr. Abby Whittington and Dr. Christopher Williams. He graduated from Cornell University with bachelors in Materials Science & Engineering in 2013. He joined Hod Lipson's research group as an undergraduate researcher in 2009 and has been involved in Additive Manufacturing research since that time. At Virginia Tech, Nick has mentored two senior design teams in the MSE department and more than ten undergraduate research assistants and REU students. His research focuses on the development of new photopolymer resins for Additive Manufacturing that have applications in aerospace, medicine, and electronics in addition to the tissue engineering applications he will discuss today.