PennState College of Engineering | BIOMEDICAL ENGINEERING

Seminar Series

Dr. Don Griffin

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University of Virginia

Zoom link:
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877816

Heparin Microislands in Microporous Annealed Particle (MAP) Hydrogels to Promote Clinically Relevant Material-Tissue Integration

September 16 • 12:05–1:20 p.m.

ABSTRACT

Regenerative biomaterial scaffolds routinely fail at the preclinical stage due to an inability to integrate with surrounding tissue and avoid a foreign body response (FBR), which is characterized by fibrotic encapsulation and sustained local inflammation around the biomaterial. To create a translational biomaterial that addresses both integration and inflammation, Dr. Don Griffin's lab has focused their efforts on a bioactive derivative of the Microporous Annealed Particle (MAP) hydrogel platform. MAP hydrogels are formed from an injectable slurry of hydrogel microspheres (microgels) that, once annealed together *in situ*, form a highly porous structure shown to promote an anti-inflammatory immune response. MAP's composition allows for ratiometric design of heterogeneous microenvironments by mixing different microgel populations. In this seminar, Dr. Griffin presents a bioactive heterogeneous scaffold using small fractions of microgels with immobilized heparin (or heparin microislands), which sequester endogenous growth factors to promote cellular migration. To demonstrate the ability of heparin microislands to promote tissue integration under challenging tissue conditions, he will present evidence of clinically relevant outcomes across three different animal models of disease, including diabetic wound healing, pancreatic islet delivery, and vocal cord reconstruction. Overall, these findings support the synergy of material porosity and chemical heterogeneity and represent a new mechanism of material-tissue integration that is both robust in application and inexpensive in implementation. Further research in the area could provide a mechanistic framework for molecular transport within the synthetic scaffolds to provide greater control of the soluble microenvironment and, subsequently, the rate and composition of integrating tissue.

BIO

Dr. Don Griffin is an assistant professor at the University of Virginia in the Departments of Biomedical Engineering and Chemical Engineering. He received his bachelor of science in biomedical engineering in 2006 from the University of California, Davis, and his doctorate in biomedical engineering in 2011 from the University of California, Los Angeles. His research focuses on the development of biomaterials for clinical translation, including diabetic wound healing, volumetric muscle loss, vocal cord reconstruction, mucosal tissue regeneration, pancreatic islet delivery, and osteoarthritis. Dr. Griffin also co-founded Tempo Therapeutics, a company in southern California focused on the commercialization of advanced biomaterials, in 2015.