STEVENS INSTITUTE of TECHNOLOGY
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University Seminar Series

Sponsored by Nanotechnology Graduate Program

Electrospinning for Functional Bone Replacement and Regeneration

BY Joseph W. Freeman
Associate Professor, Department of Biomedical Engineering
Rutgers University

EVENT DETAILS

DATE:
Wednesday, March 7, 2012

TIME:
11:00 AM

LOCATION:
Babbio 122

ATTENDANCE:
Open to Stevens Community

RSVP:
Professor Henry Du
x5262

Co-Sponsored by the Stevens Interdisciplinary Biomaterials Research and Education (SIBRE) Group

ABSTRACT

Over the last few decades, electrospinning has become an often-used technique for the production of bioengineered structures. Its ability to produce fibers on the same length scale as those in natural tissues has made its use widespread for the production of scaffolds for tissue engineering. Although the technique has become very popular, a majority of the scaffolds produced by electrospinning do not account for the large-scale architecture or functionality of the tissues that they are intended to replace or regenerate. This is particularly true for musculoskeletal tissues such as bone.

We have devised several electrospinning-based scaffolding techniques aimed to produce structures that mimic tissue architecture and produce some of the functionality of natural musculoskeletal tissues. We have been able to fabricate structures that more accurately mimic bone structure. We have been able to produce nanofibrous scaffolds with similarities to both trabecular and cortical bone architecture. These new scaffolding techniques will produce more functional replacements, which should lead to better integration with surrounding tissue and more robust tissue regeneration within the scaffolds.

BIOGRAPHY

Dr. Freeman is an Associate Professor in the Department of Biomedical Engineering at Rutgers University and the head of the Musculoskeletal Tissue Regeneration Laboratory. He received his bachelor's degree in chemical engineering from Princeton University and his doctorate in biomedical engineering from Rutgers University and the University of Medicine and Dentistry of New Jersey. Upon graduating, Dr. Freeman was a postdoc in the department of orthopaedic surgery at the University of Virginia under Dr. Cato Laurencin. He then joined the faculty of the School of Biomedical Engineering and Sciences at Virginia Tech and later joined Rutgers University. He is a Ford Fellow and recipient of the Coulter Early Career Award. He is an associate editor of "Recent Patents in Biomedical Engineering" and "Bone and Tissue Regeneration Insights." His primary research interests lie in the construction of novel, functional scaffolds for the repair of musculoskeletal tissues such as bone, cartilage, and skeletal muscle. These pursuits have also led to many secondary interests such as collagen molecular modeling, tumor engineering, treatments for damaged ligaments, and the development of new biomaterials for tissue engineering.