Biomedical Engineering
Department Seminar

Anodized Nanotubular Titanium as a Bone Anchored Prosthesis and the Effect of Electrical Stimulation

4:00 PM Monday, May 12, 2014
Seminar Room in Engineering Floor (2nd Floor)
Dr. Batur Ercan

This seminar will focus on using nanotechnology driven implants for orthopedic applications, specifically tailored towards bone-anchored implants. In order to improve the cytocompatibility properties of orthopedic implants, an anodization approach has been used to create nanotubular titanium surfaces. By synergistic combinations of biophysical cues (electrical stimulation) and altering scaffold surface feature size to nanometer regime, osteoblast (bone cell) functions were maximized, while limiting fibroblast (scar tissue forming cell) and bacterial growth. Specifically, through decreasing the surface feature size of currently used titanium implants to 20nm, and without referring to any antibiotics, a five folds decrease in *Staphylococcus aureus* bacterial density was achieved. Importantly, the coupled approach of using electrical stimulation and nanofeatured surface topography gave the best tissue response in our studies. Translatable knowledge from this work will broadly impact the field of nanobiomaterials and the implications will have a profound influence on the design and application of relevant treatment strategies in orthopedics, as well as bone anchored implants.

Dr Batur Ercan has been worked as a Postdoctoral Research Associate of Chemical Engineering at Northeastern University, working with Dr. Thomas Webster on nanobio materials. Prior to this position, he was a research fellow at the Center for Engineering in Medicine (CEM) at Harvard Medical School and Massachusetts General Hospital, under the mentorship of Dr. Mehmet Toner and specialized on microfluidic isolation of white blood cells from whole blood. He obtained his Ph.D degree at Brown University in Biomedical Engineering, and his M.S degree at Purdue University in Materials Engineering. His overarching academic goal is the incorporation of nanotechnology into regenerative medicine; in particular using nanophase materials to promote tissue regeneration. As a part of this process, he is integrating fundamental materials science concepts with biological principles to improve currently used biomaterials to heal damaged tissues.