

# Joint Faculty Candidate Seminar between Chemical and Biomedical Engineering

in  
Cherry Auditorium, Kirk Hall, 1 PM

*Presents on Monday, February 24, 2014*

## **Electromagnetically inspired biomaterials for directing biology**

By

Dr. Stephen M. Kennedy

### ***Seminar abstract***

The ability to spatially and temporally regulate the delivery of biomolecules *in vivo* is pervasively desired in contemporary and emerging biotechnological and therapeutic contexts. The ability to regulate the timing, dose, and directionality of multiple biomolecules is particularly desirable in the realm of tissue engineering, where the engineering/repair of functional tissues requires a highly choreographed sequence of localized biomolecular presentations. Here, I will describe works in progress towards the development of biomaterial systems—using simple electromagnetic principles as inspiration—that are capable of releasing molecular payloads in response to externally administered stimuli. I will describe how these systems may provide a high degree of control over the timing, dose, and directionality of multiple biomolecular presentations in wound healing and tissue engineering applications. I will also describe additional research directions geared towards directing biological processes that foundationally involve the use of electromagnetic principles. These projects will aim to (i) endow implant materials with bio-mimetic and bio-instructive properties, (ii) spatiotemporally regulate gene and drug delivery across cell membranes, and (iii) molecularly target undesirable cells for destruction.

### ***Biosketch***

Dr. Kennedy is currently a postdoctoral fellow in the Laboratory for Cell and Tissue Engineering at Harvard University's School of Engineering and Applied Sciences and the Wyss Institute for Biologically Inspired Engineering. He received his Ph.D. in electrical engineering from the University of Wisconsin in 2010 with concentrations in applied electromagnetics, cellular and molecular biology, and stem cell bioengineering. During his postgraduate training, Dr. Kennedy was awarded a National Institutes of Health Ruth L. Kirschstein Predoctoral Fellowship and a University of Wisconsin Stem Cell and Regenerative Medicine Faculty Fellowship in Interdisciplinary Bioengineering in order to investigate the use of micro-environmental charge for enhancing targeted gene and drug delivery. His current and future research endeavors involve the exploitation of fundamental electromagnetic principles in the areas of biomaterials development, controlled drug delivery, wound healing, and tissue engineering. His scientific works have been recognized three times by the Bioelectromagnetics Society and have been published in 24 peer-reviewed articles and conference papers. In 2008, he was awarded the University of Wisconsin's Gerald Holdridge Award for Excellence in Teaching and the National Institutes of Health's National Research Service Award. He is originally from Huntsville, Alabama and currently resides in Somerville, Massachusetts with his wife, Sandra, and dog, Doodles.

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