NEURAL ENGINEERING SEMINAR SERIES

Biomaterials Niche for Immuno- and Regenerative Engineering

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February 23

Noon-1:00 p.m. (E.T.)

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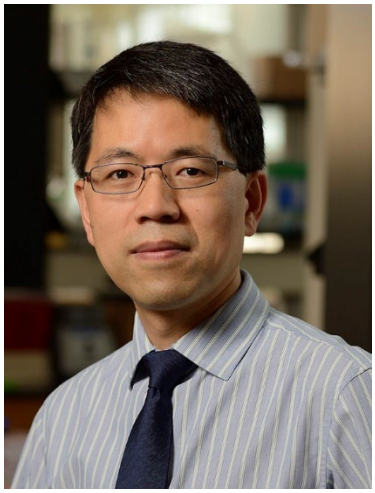

Dr. Hai-Quan Mao

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ABSTRACT: New materials with tailored structural and functional characteristics can advance the ways medical interventions are delivered to treat and prevent diseases and repair damaged tissues. This seminar discusses a nanofiber-hydrogel composite (NHC) concept by incorporating electrospun nanofiber fragments into a hyaluronic acid hydrogel network through interfacial bonding, to mimic the microarchitecture and mechanical properties of soft tissue extracellular matrix. Three different applications of this NHC will be discussed: (1) this NHC matrix can be tailored to modulate inflammatory response and mediate angiogenesis and regeneration of soft tissue and reducing secondary injury following spinal cord damage; (2) this NHC can serve as a delivery vehicle for pro-regenerative cells and biochemical cues to enhance regenerative therapies; and (3) this NHC can be engineered as an artificial lymph node with immunostimulating signals for T cell activation and expansion.

BIOGRAPHY: Dr. Mao is the Associate Director of the Institute of NanoBioTechnology (INBT) and Professor in Departments of Materials Science and Engineering and Biomedical Engineering at Johns Hopkins University. He is also a faculty member in the Translational Tissue Engineering Center at the School of Medicine. Dr. Mao received his Ph.D. degree in polymer chemistry from Wuhan University in China in 1993, completed his postdoctoral training in the Department of Biomedical Engineering at Johns Hopkins University School of Medicine from 1995 to 1998. After a short tenure as a co-principal investigator at Johns Hopkins in Singapore from 1999 to 2003, Dr. Mao joined the faculty of Whiting School of Engineering at Johns Hopkins University. Dr. Mao's research focuses on novel nanomaterials for regenerative engineering and therapeutic delivery. He developed nanofiber scaffolds for liver tissue engineering, stem cell expansion and differentiation, soft tissue regeneration, immunoengineering. His work in therapeutic engineering include design of nanoparticle assembly approaches for nucleic acid and protein therapeutics, development of scalable production methods for nanoparticles, and their applications in lymph node-targeted or systemic delivery of macromolecular therapeutics and vaccines. Dr. Mao is an Associate and Handling Editor for *Biomaterials*, and serves on the editorial boards of *ACS Biomaterials Science & Engineering* and *Journal of Materials Chemistry B*. He holds 31 U.S. patents and has published more than 190 peer-reviewed research manuscripts. He has been elected a Fellow of the American Institute for Medical and Biological Engineering and a senior member of the National Academy of Inventors.

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