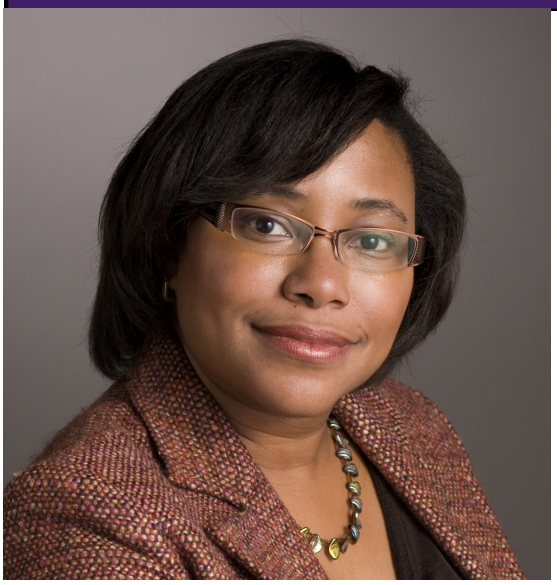
Northwestern | McCORMICK SCHOOL OF ENGINEERING

Materials Science and Engineering



DOW Lecture

Paula Hammond

David H. Koch Professor of Engineering

Department Head, Department of Chemical Engineering

Massachusetts Institute of Technology

Tuesday, May 2nd

4:00pm, Tech L361

Reception to follow in Willens Wing

Nanolayered Drug Release Systems for Regenerative Medicine and Targeted Nanotherapies

Alternating electrostatic assembly is a tool that makes it possible to create ultrathin film coatings that contain highly controlled quantities of one or more therapeutic molecules within a singular construct. These release systems greatly exceed the usual ranges of traditional degradable polymers, ranging from 10 to as high as 40 wt% drug loading within the film. The nature of the layering process enables the incorporation of different drugs within different regions of the thin film architecture; the result is an ability to uniquely tailor both the independent release profiles of each therapeutic, and the order of release of these molecules to the targeted region of the body. We demonstrate the use of this approach to release or present signaling molecules such as growth factors and siRNA and DNA to regulate genes to facilitate tissue regeneration in-situ, address soft tissue wound healing, deliver vaccines from microneedle surfaces, or administer targeted nanotherapies that are highly synergistic for cancer treatments. New developments in targeted cancer therapies for ovarian, lung and brain cancers will be addressed. Translation of these concepts to nanomaterials design for the penetration of difficult physiological barriers, including cartilage penetration for osteoarthritis, will be described.

Bio: Professor Paula T. Hammond is the David H. Koch Chair Professor of Engineering and the Department Head of the Chemical Engineering Department at the Massachusetts Institute of Technology, as well as a member of MIT's Koch Institute for Integrative Cancer Research. Her research in nanotechnology encompasses the development of new biomaterials to enable drug delivery from surfaces with spatial and temporal control. She investigates novel responsive polymers for targeted nanoparticle drug and gene delivery. Professor Hammond was elected into the 2013 Class of the American Academy of Arts and Sciences. She is also the recipient of the 2013 AIChE Charles M. A. Stine Award, which is bestowed annually to a leading researcher in recognition of outstanding contributions to the field of materials science and engineering, the AIChE Alpha Chi Sigma Award for Chemical Engineering Research and the Department of Defense Ovarian Cancer Teal Innovator Award. Prof. Hammond is an Associate Editor of the American Chemical Society journal, ACS Nano.

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