47th Annual Donald L. Katz Lectureship in Chemical Engineering

Wednesday March 15, 2017

Gerald R. Ford Library Auditorium

Lecture: 5:00 p.m. - 6:00 p.m.
Appetizers: 6:15 p.m. - 6:45 p.m.
Dinner: 6:45 p.m. - 8:30 p.m.

Professor Paula T. Hammond

Department Head and David H. Koch Professor, Department of Chemical Engineering
Koch Institute of Integrative Cancer Research
Massachusetts Institute of Technology

“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 nanomaterial’s design for the penetration of difficult physiological barriers, including cartilage penetration for osteoarthritis, will be described.