CENTER FOR NANOHYBRID FUNCTIONAL MATERIALS

FRIDAY
MARCH 29, 2013
1:00 – 3:00 PM
UNL - 237 SEC
SCOTT ENGINEERING CENTER

Dr. Srivatsan Kidambi

Assistant Professor, Chemical and Biomolecular Engineering, UNL

Engineering Nanostructured Polymer Films for *In Vitro* Models of Living Tissues

Over the past decade, the development of novel thin films that could lead to significant advances in the fields of tissue engineering, drug delivery and biosensors have become increasingly germane areas of research. The ionic layer-by-layer (LbL) assembly technique called "Polyelectrolyte Multilayers (PEMs)", introduced by Decher in 1991, has emerged as a versatile and inexpensive method of constructing polymeric thin films, with nanometer-scale control of ionized species. PEMs have long been utilized in such applications as sensors, electrochromics, and nano-mechanical thin films but recently they have also been shown to be excellent candidates for biomaterial applications. Our lab aims to develop novel nano-structured materials with highly-controlled architectures and chemistries for tissue engineering and drug delivery applications. These novel surfaces will be used for the various applications including 1) engineering 2D and 3-D tissue engineering models, 2) developing biological arrays for sensor applications and 3) engineering targeted nano-scale drug delivery vehicles primarily focusing on the treatment of neurodegenerative diseases. In this talk, I will describe the engineering of novel highly customizable PEM thin films for tissue engineering and drug delivery applications. PEM films were engineered to control the adhesion of various cells including primary hepatocytes, primary neurons, breast cancer cells, and mesenchymal stem cells without the aid of adhesive proteins/ligands. These films were further used to engineer patterned co-cultures to mimic the cell-cell interaction in liver, brain and tumor tissue. In addition, I will describe the engineering of novel salt tunable m-d-poly(ethylene glycol) (m-dPEG) patterns onto PEMs that have potential applications in microelectronic devices and electro-optical and biochemical sensors. These removable surfaces provide an alternative method to form patterns of multiple particles, proteins and cells and ability to engineer biosensors for high throughput screening.

Seminar hosted by Dr. Alex Sinitskii, UNL Chemistry Department

University of Nebraska Lincoln