Polymer Nanomaterials for Drug Delivery and Cell Transplantation

Eugenia Kharlampieva, University of Alabama at Birmingham, AL 35294, USA

Bio-inspired fabrication of biologically-active and stimuli-sensitive nanostructured materials are of increasing interest in bio- and nanotechnology. This talk will focus on functional ultrathin coatings and hollow microcontainers (capsules) obtained by hydrogen-bonded layer-by-layer assembly of synthetic and biological macromolecules on inorganic templates and living cells. We will discuss pH-triggered volume and shape transitions in these materials to be used for controlled drug delivery. We will also address the application of nanostructured coatings in cell-based transplantation therapy. We will introduce nanothin immunomodulatory coatings with diminished inflammatory immune responses deposited on surfaces of mammalian pancreatic islet cells. These materials provide prolonged cell viability and function to be used in diabetes treatment.