MichiganTech

Chemical Engineering

Grain Processing Corporation

2011-12 Lecture Series

presents

Friday
April 13, 2012

10:00a.m.

Chem. Sci. & Engineering Room 102

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Iowa State University
Stanley Professor and Chair
Department of Chemical and Biological Engineering

Self-assembling block copolymers for gene delivery and biomineralization

We have synthesized a family of novel self-assembling pH and temperature sensitive multiblock cationic and anionic copolymers with a variety of nanoarchitectures. The copolymers exhibit pH sensitivity and thermo-reversible gelation at physiological temperatures. The cationic multiblock copolymers exhibit complexation with DNA and serve as excellent gene therapy vectors for cancer therapies. Our studies have shown that these polymeric vectors show sustained gene delivery and selective transfection in cancer cells versus non-cancer cells. Detailed mechanistic studies have shown that the selectivity arises due to intracellular differences in pH between cancer and normal cells. The anionic multiblock copolymers and their micelles also serve as excellent templates for biomineralization. These hierarchically self-assembling copolymers in conjunction with mineralization proteins/peptides, form bioinspired self-assembled nanocomposites. These novel injectable insitu-forming nanocomposites show mechanical properties similar to that of native cartilage, and are being investigated for cartilage rescue to prevent post-traumatic osteoarthritis.

Refreshments will be served