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NanoEngineering

UC SAN DIEGO NANOENGINEERING

Wednesday, May 31, 2017
Seminar Presentation: 11:00am – 12:00pm
Cymer Conference Center, SME 248

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Polymer Engineering with Proteins and Peptides for Biomedicine

Abstract:
Projects in the Pokorski lab will be described detailing work ranging from the macro-scale to the molecular scale. These projects utilize polymer processing and synthetic chemistry to fabricate or synthesize biologically relevant materials. In one example, a new type of nano-fibrous polymeric system is described, where chemical modifications can be easily implemented to introduce biologically active molecules onto the surface. Our process begins by using a coextrusion and multiplication method, to yield degradable nanofibers in exceptionally high throughput. The fibers can be chemically modified to create novel function in order to manipulate surface properties and their interactions with cells. Subsequent cell-based studies have demonstrated targeted manipulation of cell phenotype and antifouling behaviour of the fibrous materials. The second portion will describe melt-processing of several protein candidates and the effect on macromolecular structure and enzymatic activity of the processed proteins. Melt processing is exceptional scalable, and is thought to be possible because of the reduced hydration state in the melt, thus eliminating the driving force to form amorphous protein aggregates. The primary focus of this portion on the seminar will be a discussion of virus like nanoparticles (VLPs) derived from bacteriophage Qβ, which is a combinatorial vaccine platform. Melt processing conditions, physical models of processing, and biological data will be described in which Qβ is processed into slow-release depot delivery formulations.

Biosketch:
Professor Pokorski began his scientific career by earning his B.S. in biochemistry from UCLA in 2002. While at UCLA, he worked in private industry designing and testing biomedical devices that are currently in use around the world. In 2007, Dr. Pokorski received his doctoral degree in organic chemistry from Northwestern University, where he designed, synthesized, and tested diverse peptidomimetic systems for use in medical diagnostics and therapeutics. Dr. Pokorski then moved to The Scripps Research Institute, where he used both chemical and genetic engineering of viral nanoparticles to synthesize novel drug delivery systems. During postdoctoral training, Dr. Pokorski first earned a NIH Ruth Kirschstein fellowship and later secured an NIH Pathway to Independence Award. Dr. Pokorski's joined the faculty at Case Western Reserve university in the department of Macromolecular Science and Engineering in 2012. Pokorski's laboratory works to bridge chemical synthesis, molecular biology, and materials science to make new materials for biomedical applications. The Pokorski lab is particularly interested in marrying protein and polymer science to generate new materials for drug delivery, imaging, and vaccination. Research in the Pokorski lab is funded through grants from the National Institutes of Health, National Science Foundation, and the American Chemical Society. He has been awarded several prestigious awards, including a 2013 ACS PRF New Investigator Award and, in 2016, he was elected a Kavli Fellow.