BIOSKETCHES & ABSTRACTS

Herbert D. Doan
Nanotechnology Symposium

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D. Dan & Betty Kahn Auditorium
Biomedical Science Research Bldg (BSRB)
109 Zina Pitcher Place
Ann Arbor, MI

Hosted by
Michigan Nanotechnology Institute for Medicine and Biological Sciences (MNIMBS)

Gregory N. Tew, PhD
Polymer Science and Engineering Department
University of Massachusetts-Amherst, Amherst, MA

Dr. Greg Tew earned a B.S. in Chemistry in 1995 from North Carolina State University with honors. He attended the University of Illinois-Urbana to pursue graduate studies on self-assembling rod-coil molecules. In 2000, he accepted a faculty position in Polymer Science and Engineering at the University of Massachusetts, Amherst. However, before starting on the faculty he spent one year in Prof. William DeGrado's laboratory at the University of Pennsylvania in Biochemistry and Biophysics. In 2001, he started at U Mass and since then has received numerous awards including the Office of Naval Research and Army Research Office Young Investigator Awards, the 3M Nontenured Faculty Grant, and the DuPont Young Faculty Award. In May of 2004, he was invited to the White House to receive the highest honor given by the Federal government to young investigators, the Presidential Early Career Award for Scientists and Engineers (PECASE). Most recently, he was named the first Mark Young Scholar from the Polymer Division of the American Chemical Society and selected as a member of the 2010-2011 Defense Science Study Group. His research interests include supramolecular polymer science, bioinspired and biomimetic structures, polymers for biomedical science, self organization, well defined macromolecular architectures, functional materials, novel biomaterials and hydrogels, which have resulted in more than 100 peer-reviewed publications.

Presentation: *Capturing Protein Activity in Simple Synthetic Polymers*
Abstract: Polymeric molecules have fascinated scientists for years. From a natural standpoint, however, these molecules remain relatively unsophisticated. Perhaps the most well known example of advanced properties in macromolecules comes from biopolymers like DNA and proteins. Our laboratory has focused on creating novel polymeric molecules with increased functionality in order to enable new properties and applications. This lecture will highlight two efforts in the biomimetic arena. We will discuss how the design has led to novel antibiotics, on one hand, and cell penetrating peptide mimics on the other.

Kathryn Uhrich, PhD
Professor of Chemistry & Chemical Biology
Dean of Math and Physical Sciences
Rutgers, Piscataway, NJ

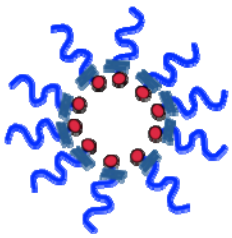
Dr. Kathryn Uhrich is a Professor of Chemistry at Rutgers University, where she also holds graduate appointments in Biomedical Engineering, Chemical Engineering and Pharmaceutics. She received her BS degree at the University of North Dakota, and PhD degree from Cornell University. Before moving to her present post at Rutgers in 1995, she held post-doctoral positions at AT&T Bell Laboratories and Massachusetts Institute of Technology. Kathryn is currently the Dean of Math and Physical Sciences at Rutgers University.

Her research is funded by National Institutes of Health and the National Science Foundation. Kathryn has received the Johnson & Johnson Discovery (1996), Hoechst Celanese Innovative Research (1996 and 1997), and National Science Foundation CAREER (2000) awards. She is co-founder of Polymerix (2000-08), recipient of the 2003 recipient of New Jersey's "Best Life Sciences/Healthcare Company". Recent awards include the Thomas Alva Edison patent award (2003), New Jersey's Outstanding Scientist in Biomedical Research (2004), ACS-sponsored Buck-Whitney award (2005) and the New York Academy of Sciences Blavatnik Award (2007). Currently, she is co-Director of an NSF IGERT program on "Biointerfaces" (2004-08) and on "Stem Cells (2008-12).

Her research accomplishments have been recognized and disseminated in hundreds of publications and conference proceedings along with hundreds of invited presentations at local, national and international levels. In

addition, she currently has over one hundred US and world-wide patents and applications. Her innovative research in polymer chemistry and biomaterials at Rutgers has trained nearly one hundred graduate and undergraduate students.

Presentation: *Polymer Therapeutics: from PolymerDrugs to Polymeric Micelles*
Abstract: The focus in my laboratory is on the synthesis and characterization of biocompatible polymers for biomedical applications, including drug delivery and tissue engineering. Of the three main projects in my research program, this lecture will focus on our two drug delivery programs. First, nanoscale amphiphilic macromolecules were initially synthesized to encapsulate hydrophobic drugs and improve the water-solubility. Current research has shown that the polymers themselves are bioactive – they actively coordinate with binding domains on low density lipoproteins. In addition, the polymeric micelles can be slightly modified for complexation with oligonucleotides and plasmids. Second, PolymerDrugs are polymers that biodegrade into therapeutically useful molecules. The first example was a poly(anhydride-esters) that yielded salicylic acid, the active component of aspirin. This polymeric system (aka PolyAspirin^{TM}) is the first example in which the polymer itself is a controlled-release system: the polymer backbone degrades into salicylic acid, an anti-inflammatory and analgesic compound. More recently, we've expanded our program to include PolyAntibiotics and PolyAntiseptics useful for simultaneously controlling pain, inflammation and infection.



Micellar Nanocarrier

PolyAspirin Stent

Eric Betzig, PhD
Janelia Farm Research Campus, Ashburn, VA

Eric Betzig (Caltech '83, Cornell '88) is an Ann Arbor native who has devoted the bulk of his career to the development of new optical imaging tools. His thesis involved the early development of near-field optical microscopy, the first optical imaging methodology to break the diffraction barrier, creating detailed images at the nanometric scale. He continued this work for six years as a Member of Technical Staff at AT&T Bell Labs in Murray Hill, NJ, where he refined the method and demonstrated applications including high density data storage, low temperature semiconductor spectroscopy, and the first single molecule microscopy and spectroscopy under ambient conditions. After a long detour from academia devising a new machine tool technology, he returned to microscopy after learning about fluorescent proteins. This led to his co-invention, with Harald Hess, of photoactivated localization microscopy (PALM), a method to image proteins within cells at near-molecular resolution. Since 2005, he has been a Group Leader at the Janelia Farm Research Campus of the Howard Hughes Medical Institute, where he continues to develop new imaging tools, most notably Bessel beam plane illumination microscopy and adaptive optics for deep tissue imaging.

Presentation: *Pushing the Envelope in Biological Imaging*
Abstract: Optical microscopy has been instrumental in studies of the structure and function of biological systems for centuries. However, many questions at the forefront of molecular, cellular, and neurobiology remain beyond its current capabilities. I will discuss efforts in my group to extend these capabilities in areas such as super resolution optics, photodamage mediation, high speed volumetric imaging, and deep tissue imaging.