

ND Energy *DISTINGUISHED* **LECTURE**



Center for Sustainable Energy at Notre Dame

Nanostructured Functional Materials by Atom Transfer Radical Polymerization

September 10

4:00 pm

**123 Nieuwland
Science Hall**

Many advanced nanostructured functional materials were recently designed and prepared by controlled/living radical polymerization (CRP). More than 100 million tons of polymers are produced annually worldwide by conventional radical polymerization. However, macromolecular engineering is impossible in this process. Copper-based ATRP (atom transfer radical polymerization) catalytic systems with polydentate nitrogen ligands are among most efficient controlled/living radical polymerization systems. Recently, by applying new initiating/catalytic systems, Cu level in ATRP was reduced to a few ppm. ATRP of acrylates, methacrylates, styrenes, acrylamides, acrylonitrile and other vinyl monomers was employed for macromolecular engineering of polymers with precisely controlled molecular weights, low dispersities, designed shape, composition and functionality. Examples of block, graft, star, hyperbranched, gradient and periodic copolymers, molecular brushes and various hybrid materials and bioconjugates prepared with high precision will be presented. These polymers can be used as components of various advanced materials such as health and beauty products, bio-medical and electronic materials, coatings, elastomers, adhesives, surfactants, dispersants, lubricants, additives, or sealants. Special emphasis will be on nanostructured functional materials for application related to environment, energy and catalysis.

Krzysztof (Kris) Matyjaszewski is the J.C. Warner University Professor of Natural Sciences at Carnegie Mellon University. He was born in Konstanynow, Poland, received his doctorate from the Polish Academy of Sciences in 1976, and completed a postdoctoral fellowship at the University of Florida in 1977. From 1978 to 1984, he was a research associate of the Polish Academy of Sciences. From 1984 to 1985, he held appointments at the University of Paris, first as a research associate and then as a visiting professor. In 1985, he joined Carnegie Mellon, where he founded and currently directs the Center for Macromolecular Engineering. Dr. Matyjaszewski developed atom transfer radical polymerization, commercialized in the US, Europe and in Japan (16 signed licenses).

Dr. Matyjaszewski has co-authored 800 publications (cited over 60,000 times, h-index 128), co-edited 17 books, holds 47 US and 132 international patents. He received the 2014 National Institute of Materials Science (Japan) Award, 2013 Inaugural AkzoNobel North American Science Award, 2012 Maria Sklodowska-Curie Medal, 2011 Wolf Prize in Chemistry, 2009 Presidential Green Chemistry Challenge Award, and from the American Chemical Society, the 2011 Hermann Mark Award, 2011 Award in Applied Polymer Science, 2002 Polymer Chemistry Award, and the 1995 Creative Polymer Chemistry Award. He is a member of the USA National Academy of Engineering, Polish Academy of Sciences, and Russian Academy of Sciences and has received 7 honorary degrees.



Kris Matyjaszewski
J.C. Warner Professor of
Natural Sciences
Carnegie Mellon University