Friday, November 6, 2009
10:00 A.M. (refreshments available at 9:45 A.M.)
102 Colburn Laboratory

Professor Kenneth R. Carter
Department of Polymer Science and Engineering
University of Massachusetts-Amherst

- B.S. Chemistry, State University of New York - Oneonta, 1985
- Ph.D. Chemistry, University of Vermont, 1991

Dr. Carter joined the UMass Polymer Science and Engineering Department faculty in 2004 after performing polymer research for 13 years at IBM’s Almaden Research Center in San Jose, CA. His research involves the synthesis and characterization of novel polymeric materials with specially designed properties. Carter’s research has focused on the development of organic and hybrid materials for future use in advanced electronics and storage technologies. Dr. Carter has numerous publications and over 24 patents in these areas. The materials and processes invented have been integrated into manufacturing environments in conjunction with workers in IBM’s development and manufacturing divisions. Since joining the faculty at UMass, Dr. Carter has been a co-leader in the establishment of the University of Massachusetts Nanoimprint Lithography Laboratory and is a Test Bed Project coordinator for the new NSF-funded Nanoscale Science and Engineering Center for Hierarchical Manufacturing at UMass. He is currently the Associate Director for Research of the UMass Materials Research Science & Engineering Center on Polymers (MRSEC). His teaching interests include graduate-level courses in polymer chemistry and advanced polymeric materials. His research group at UMass focuses on polymer synthesis, polymer brush layers, organic electronic materials, and advanced nanopatterned materials design and synthesis.

- 2007 National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) Percy L. Julian Award
- Chairman, American Chemical Society Division of Polymer Chemistry (2004)
- Co-Director of the UMass Nanoimprint Lithography Laboratory
- Test-Bed Program Manager, Center for Hierarchical Manufacturing- NSEC
- 3M Corp- Non- Tenured Faculty Award
- IBM Corporation- Invention Achievement Awards (6)

“Hierarchically Patterned Polymers”

While our research group is active in a number of areas, our research generally concerns the design, synthesis, and utilization of polymer surfaces with specially designed properties. We combine our interest in materials design with new, powerful nanopatterning methods in ways that allow us to create surfaces with hierarchical control over pattern dimensions and function. We have strong interest in materials that have application in areas such as information technology devices, biotechnology and specialty coatings, especially where control of nanoscopic features becomes important. We are able to directly pattern functional layers of embedded chemical functionality into crosslinked network polymers and access these reactive groups in subsequent reactions. Our approach allows for the creation of surfaces with controlled size and chemistry. We have demonstrated that this methodology works from flat films, patterned nanostructures, and particles, providing a powerful, robust, new technique for functionalizing surfaces. This concept of embedded functionality has been exploited in a number of ways. For example, we have used these surfaces for selective metallization and we have been exploiting the surface functionality to accommodate the attachment of semiconducting polymers and bioactive materials. The synthesis, characterization and use of these new materials and related techniques will be discussed.