



## BNC Distinguished Seminar

# Large Area Fabrication of Functional Polymer, Hybrid, and Inorganic Structures and Surfaces for Optical, Electronic, Energy and Health Applications

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11:00am – 12:00pm, BRK 1001

**Bio:** Jim Watkins is Professor of Polymer Science and Engineering and Director of the Institute for Hierarchical Manufacturing at the University of Massachusetts, Amherst. Professor Watkins received his B.S. and M.S. degrees in Chemical Engineering from the Johns Hopkins University and his Ph.D. in Polymer Science and Engineering from the University of Massachusetts. He joined the Chemical Engineering faculty at UMass in 1996 and the Polymer Science and Engineering faculty in 2005. He is the recipient of a Camille Dreyfus Teacher-Scholar Award and a David and Lucile Packard Foundation Fellowship for Science and Engineering and is a Fellow of the American Physical Society.

**Abstract:** The production of next generation functional films, materials and devices faces conflicting requirements of precise control over composition and structure at the micro or nanoscale and scalable, cost-effective manufacturing. We are developing new incarnations of nanoimprint lithography, self-assembly and photothermal processing that in combination with new materials sets meet these requirements. Examples to be discussed include the direct printing of high energy and power density microbatteries using nanoparticle-based inks, roll-to-roll sub-millisecond photothermal fabrication of multi-layer graphene composites for energy applications using simple precursors, and rapid assembly of brush block copolymer nanoparticle hybrids for one step coating of photonic materials. Each of the processes is scalable on the tool platforms available in the UMass Advanced Print and Large Area Manufacturing Demonstration Facility.