

“Processing to Manipulate Nanostructures in Order Nanoporous Films”

University of Akron

Professor, Department of Polymer Engineering

Host: Greg Liu



University of Akron

Department of Polymer Engineering

Phone: (330) 972-8608

E-mail: vogt@uakron.edu

Abstract: The tethering of chemically dissimilar polymeric segments in block copolymers provides a facile route to periodic nanostructures through self-assembly. Here, the selective incorporation of functional precursors to one phase of a block copolymer through strong interactions (electrostatics or hydrogen bonding) is used generate nanostructures that can be selectively transformed to generate pores in one phase. This methodology enables a ‘plug and play’ approach with the same block copolymer being capable of templating families of materials to minimize the synthetic effort requirements. In this talk, I will focus on the fabrication of nanoporous carbon films from polymeric precursors through this cooperative assembly approach. Processing routes to overcome kinetic limitations with self-assembly will be discussed, including borrowing of concepts from the block copolymer film literature. These concepts can be utilized to enhance the long range ordering of the nanostructure, tune the pore size, and alter the pore geometry. Scalable synthesis of these materials is possible through roll-to-roll manufacturing and meters of highly ordered films have been demonstrated. I will discuss briefly how zone annealing concepts associated with the purification of crystalline materials can be extended to allow the large scale production of aligned nanostructured carbons on a roll-to-roll process and how these materials can be modified during the carbonization process to yield nanoporous doped carbon materials with higher heteroatom content than typically achieved for carbon doping.

Bio: Bryan D. Vogt is a professor in the Department of Polymer Engineering at the University of Akron. He received his BS at Michigan Technological University in Chemical Engineering. He received his PhD in Chemical Engineering while working with Jim Watkins at the University of Massachusetts and was a NRC postdoctoral fellow with Wen-li Wu in the Polymers Division at NIST in Gaithersburg, MD. He joined the faculty at Arizona State University in Chemical Engineering in 2006. He received an NSF CAREER Award in 2008. He moved to the University of Akron in fall 2011. His research interests focus on self-assembly and interfacial phenomenon with a focus on how these structures can be used for fundamental understanding of critical phenomenon in emergent technologies. Specific applications of interest are biobutanol recovery, ice prevention, next generation battery technologies, robust adhesives, and preventing traumatic brain injuries with mechanically responsive soft materials.

Sponsored by the

Solvay International Chemical Group

DATE: NOVEMBER 15, 2017

TIME: 11:15AM-12:15PM

LOCATION: 310 KELLY HALL

