

Materials Chemistry Seminar

Monday, 3:30 pm
February 3, 201

Room 1315
Chemistry Building



Professor Padma Gopalan
University of Wisconsin
Materials Science & Engineering

“Polymer Brushes, Blocks and Nano-patterns”

We have developed a highly versatile universal approach to grow polymer brushes from a variety of substrates with high grafting density by using a single-component coating. We describe a random copolymer which consists of a polymerizable initiator, copolymerized with a thermal crosslinker by reversible addition-fragmentation chain-transfer polymerization. Surface-initiated atom transfer radical polymerization (SI-ATRP) was used to grow brushes with high grafting density on the substrate. Detailed characterization of these brushes by ellipsometry, X-ray photoelectron spectroscopy, and atomic force microscopy will be presented. The chemistry of the coating was modified to implement a bottom up approach to fabricate nano-patterned polymer brushes. By self-assembly of a block copolymer film on top of the coating, nanopatterned brushes were grown after selective removal of one domain from the block copolymer. The initiator containing cross-linkable copolymer can be viewed as a single component ultra-thin polymeric coating which can be applied to a range of substrates to grow high chain density polymer brushes. The ease of synthesis, chemical tunability, homogeneity of composition, stability in organic solvents and applicability by simple spin-coating to a wide range of substrates makes this a versatile approach to create functionalized interfaces.