Abstract:
The lithographic creation of controlled nanometer scale structures is of increasing interest in many applications ranging from biotechnology to nanotechnology. Lithography and the processes associated with it are the backbone of the nanotechnology revolution. Several developments are occurring simultaneously: a drive to reduce minimum feature size for advances in microelectronics, the use of lithographically patterned structures to prepare devices for photonics, biotechnology and other forms of nanotechnology and the drive to create 3-dimensional structures for new device and materials construction.

In an effort to develop single-layer resists for EUV (13 nm) lithography, we have exploited a variety of low molecular weight polymers and molecular glasses. An important motivation for this work is the realization that next generation lithography is approaching features sizes comparable to that of many polymer molecules. A successful strategy to develop single-layer resists that are highly transparent at EUV wavelengths using cyclic and branched molecular glasses will be discussed.

Despite success in conventional photoresists, to date structures below 20 nm remain elusive. To achieve these small-scale structures, self-assembly of block copolymers offers an alternative. Work on self-assembly, solvent annealing and patterning of block copolymers will be described.