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Solvent-Vapor-Mitigation of Electrostatics in 3D Cyclopropenium Diblock Copolyelectrolyte Network SEBASTIAN RUSSELL[1], SANAT KUMAR[2], LUIS CAMPOS[3], Columbia University — Photolithography is progressively becoming an obsolete manufacturing technique in the microelectronic industry as block copolymer (BCP) nanoassembles approach sub 10-nm features sizes. Thermodynamically, the morphology and limiting feature size, for BCP, are determined by the relative volume fraction and magnitude of the incompatibility (χN) between each block. Therefore, to achieve smaller dimensions, it is imperative to devise copolymer systems that are strongly segregating (χN >>10) by utilizing high monomer incompatibility, large χ. For synthetic cylinder forming BCPs, achieving sub-10 nm features with a high degree of lateral ordering still remains a challenge. Covalently bound ions could potentially be a route towards enhancing the segmental incompatibility and this presentation will focus on the self-assembly of post-polymerization functionalized cyclopropenium-ion diblock copolyelectrolytes (DBCPE) through solvent vapor annealing. By varying the BCPE's total degree of polymerization and charge fraction we have mapped the kinetic phase-space. This control over morphology has opened the door to sub-10nm features with tunable densities by varying the length of the neutral and polyelectrolyte block, respectively.

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