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Graphoepitaxy of 2D array of Spheres in Di-block Copolymers[1]
ADETUNJI ONIKOYI, EDWARD KRAMER, University of California, Santa Barbara — The use of block copolymer (BCP) thin films to create periodic structures on a nanolength scale has proved to be very effective [1-3]. However, removing defects and improving translational order in the periodic structures remain important goals. This study exploits a form of graphoepitaxy as a means to influence translational and orientational order in a polystyrene-b-poly-2-vinylpyridine (PS-b-PVP) diblock copolymer. Here, the domains of the BCP thin film are allowed to order within sub-micron sized wells of various shapes. Effects on order and 2D melting behavior are examined. The wells are patterned into silicon substrates using electron-beam lithography. Secondary ion mass spectroscopy and scanning force microscopy are then used to characterize the self-assembly process. Results show that a near perfect hexagonal 2D lattice can be obtained in diamond shaped wells of appropriate dimensions. Perfect 6 fold symmetry is disfavored in square wells; rather, regions of meta-stable square packing or defect dense regions of hexagonal packing are observed. Further studies are being performed to understand these effects on melting behavior. [1] Segalman et al. Phys. Rev. Lett., 2003, 91, 196101 [2] Kim et al. Nature, 2003, 424, 411 [3] Guarini et al. International Electron Devices Meeting

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