Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Controlling the alignment and the morphology of bilayer BCP films using templated self-assembly AMIR TAVAKKOLI K. G., MIT, Dept. of Electrical Engineering and Computer Science, KEVIN W. GOTRIK, ADAM F. HANNON, ALFREDO ALEXANDER-KATZ, CAROLINE A. ROSS, MIT, Dept. of Materials Science and Engineering, KARL K. BERGGREN, MIT, Dept. of Electrical Engineering and Computer Science — Templated self-assembly of block copolymer (BCP) thin films can control the alignment of BCP microdomains in a single layer using chemical and topographical methods. However, controlling the alignment and the morphology of BCP microdomains in two different layers simultaneously and fabricating complicated three-dimensional (3D) structures is relatively unexplored. This control is useful for the fabrication of multilevel thin film devices. Also, the forces and energetics governing BCP self-assembly are better understood at the bulk scale. This paper discusses how to control the BCP in two different layers by using a majority-block-functionalized post template. We showed by using an array of majority block functionalized posts, we could fabricate very complicated three-dimensional structures and we were able to control the BCP in two different layers. We fabricated three dimensional junctions and bends in two different levels of the BCP, bottom and top. Moreover, we showed we could fabricate periodic superstructures as well as changing the morphology of the BCP in one of the layers from the original cylinders to ellipsoids, spheres, and bicontinuous cylinders and having two different morphologies on top of each other.

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Date submitted: 28 Nov 2011 Electronic form version 1.4