Supporting Information

Patterning at the 10 Nanometer Length Scale using a Strongly Segregating Block Copolymer Thin Film and Vapor Phase Infiltration of Inorganic Precursors.

Jonathan W. Choi[1], Zhaodong Li[1], Charles T. Black[2], Daniel P. Sweat[3], Xudong Wang[1], and Padma Gopalan[1]*

[1]Department of Materials Science and Engineering, University of Wisconsin-Madison, Wisconsin 53706

[2]Center for Functional Nanomaterials, Brookhaven National Laboratory, New York 11973

[3]Department of Chemistry, University of Wisconsin-Madison, Wisconsin 53706

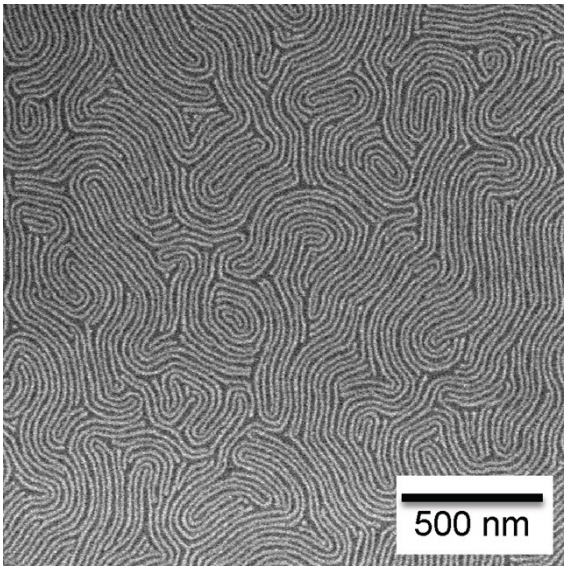

Figure S1. Low magnification SEM image of the ALO nanowires showing no island/hole structures.

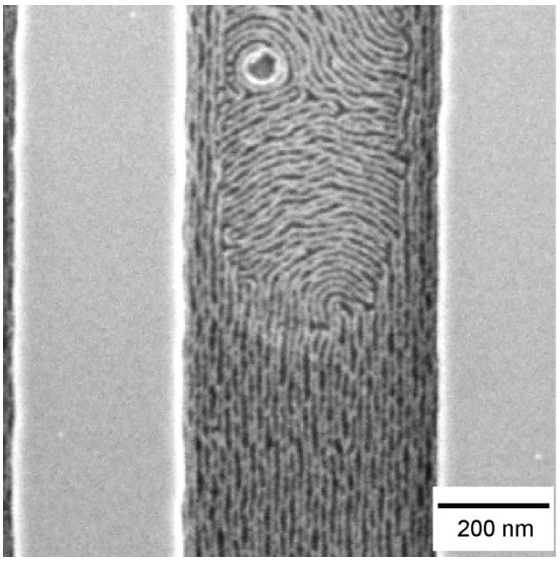

Figure S2. SEM image of P(tBS-*b*-2VP) (mol wt. 6.1K-1.6K) in a 410 nm rectangular shaped trench showing a change in microdomain alignment. This can be explained by the thickness of the film being one monolayer in the top portion then a region of bilayer of cylinders in the bottom half. This is consistent with the report by Hammond et al. and Mishra et al. where a monolayer of a 2VP cylinder forming PS-*b*-2VP inside a graphoepitaxial trench displayed a lower degree of alignment within a trench compared to a bilayer. The authors explain that it is most likely because a bilayer film is closer to the bulk ODT of the BCP, whereas a monolayer exhibits a depression in ODT.[1, 2].

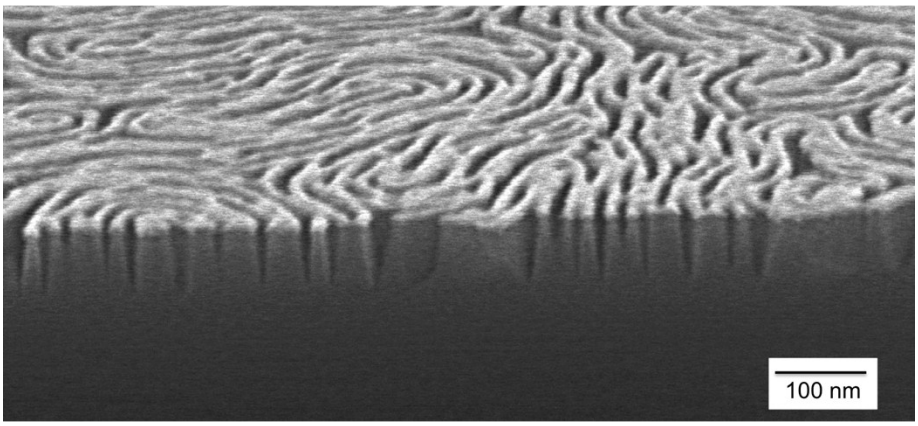

Figure S3. Low magnification SEM image of 11.9K-3.0K pattern transferred film.

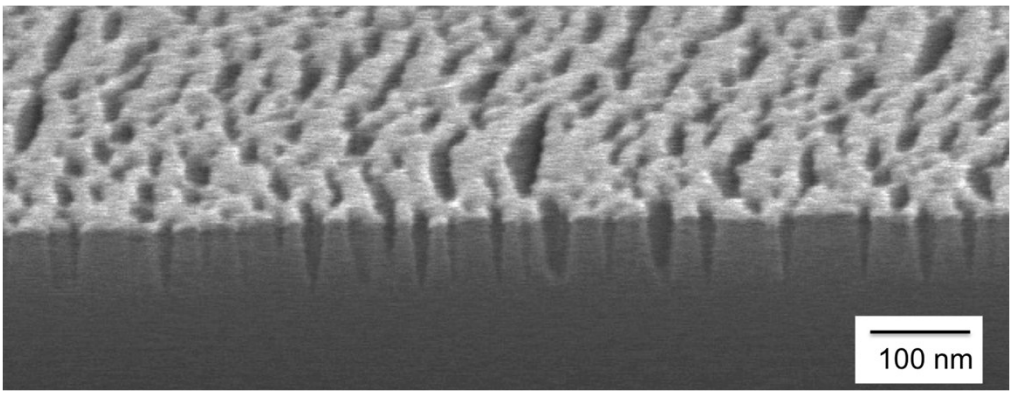

Figure S4. Low magnification SEM image of 6.1K-1.6K pattern transferred film.

References:

[1] Hammond M R, Cochran E, Fredrickson G H and Kramer E J 2005 Temperature dependence of order, disorder, and defects in laterally confined diblock copolymer cylinder monolayers *Macromolecules* **38** 6575-85

[2] Mishra V, Fredrickson G H and Kramer E J 2012 Effect of film thickness and domain spacing on defect densities in directed self-assembly of cylindrical morphology block copolymers *ACS Nano* **6** 2629-41