

Supporting Information for “Tunable and rapid self-assembly of block copolymers using mixed solvent vapors”

Woon Ik Park,^a Sheng Tong,^b Yuzi Liu,^b Il Woong Jung,^b Andreas Roelofs,^b and Seungbum Hong^{*a}

^a*Materials Science Division, Argonne National Laboratory, Lemont, IL 60439, USA*

^b*Nanoscience and Technology Division, Argonne National Laboratory (ANL), Lemont, IL 60439, USA*

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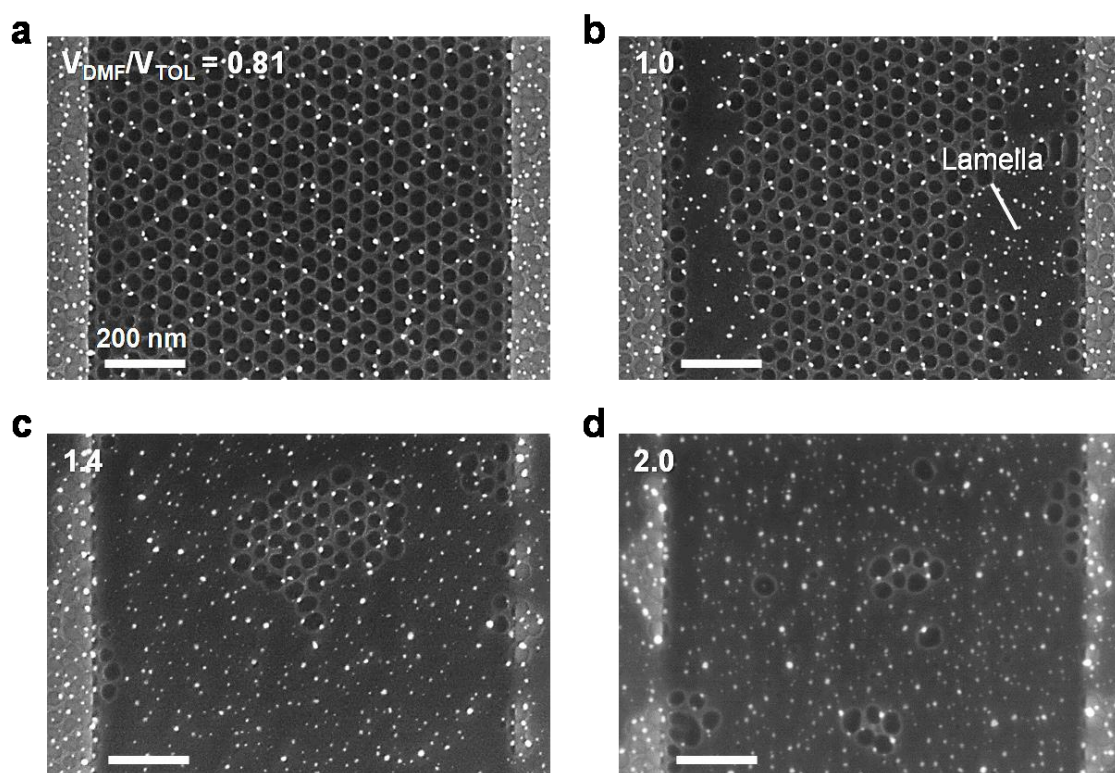


Fig. S1 Morphology transition from HPL to lamella structures for SV42 BCP depending on $V_{\text{DMF}}/V_{\text{TOL}}$ ratio. (a) $V_{\text{DMF}}/V_{\text{TOL}} = 0.81$, (b) 1.0, (c) 1.4, (d) 2.0. Lamellar morphology began to appear at $V_{\text{DMF}}/V_{\text{TOL}} = 1.0$. As the fraction of DMF increased, the effective volume fraction of P2VP ($f_{\text{P2VP}}^{\text{eff}}$) increased in proportion to $V_{\text{DMF}}/V_{\text{TOL}}$ ratio, showing the complete morphological change from HPL ($V_{\text{DMF}}/V_{\text{TOL}} = 0.81$) to lamellar structure at $V_{\text{DMF}}/V_{\text{TOL}} = 2.0$.

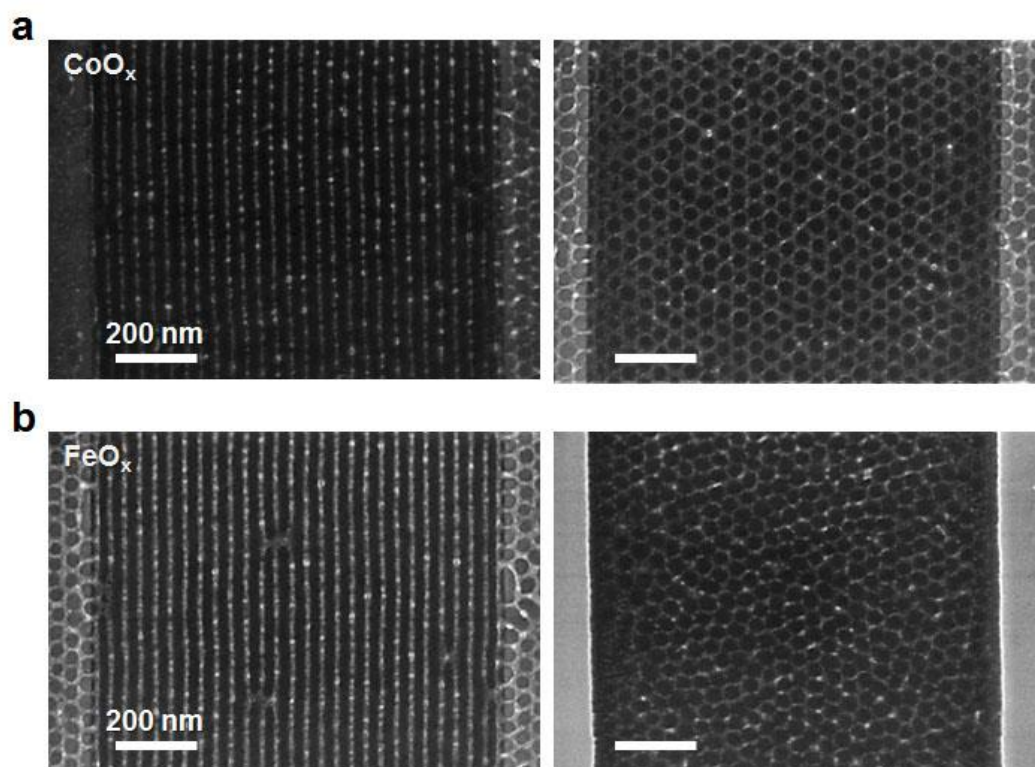


Fig. S2 Self-assembled metal-oxide line and HPL patterns *via* various metal ion incorporation process followed by O_2 plasma treatment at $V_{\text{DMF}}/V_{\text{TOL}} = 0$ (pure toluene) and 0.71, respectively. (a) CoO_x , and (b) FeO_x .

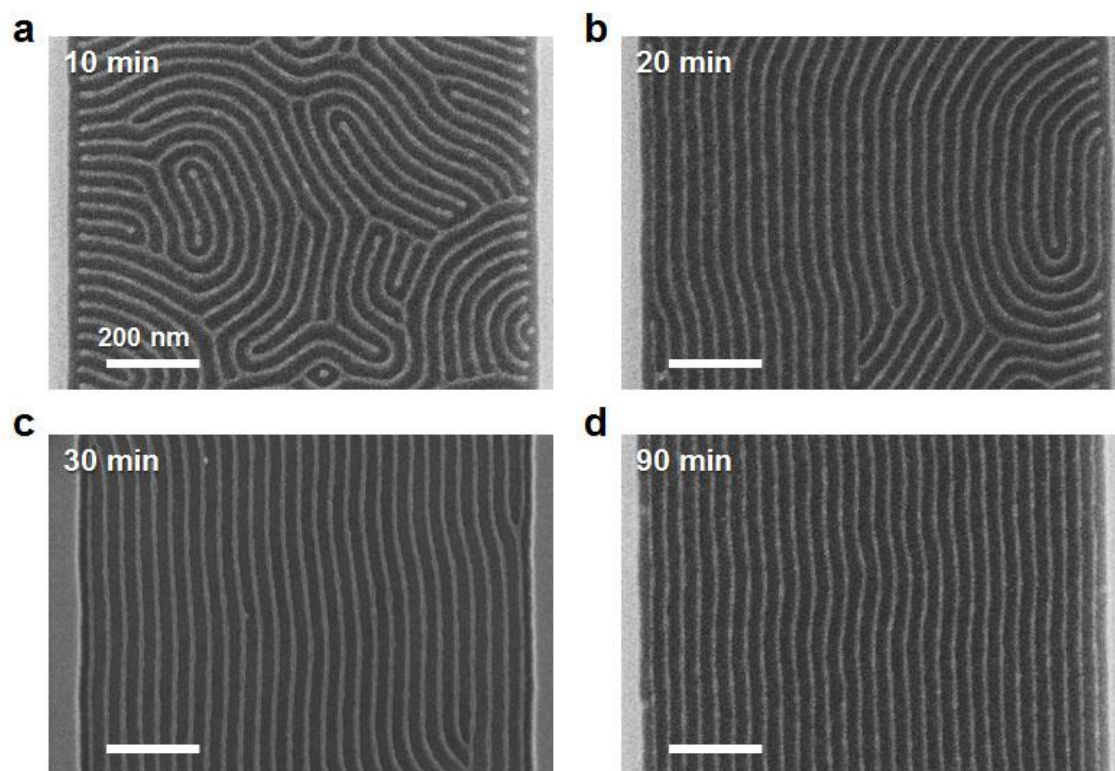


Fig. S3 Time-evolution of the self-assembled SV42 BCP *via* pure toluene treatment. (a) 10 min, (b) 20 min, (c) 30 min, and (d) 90 min.

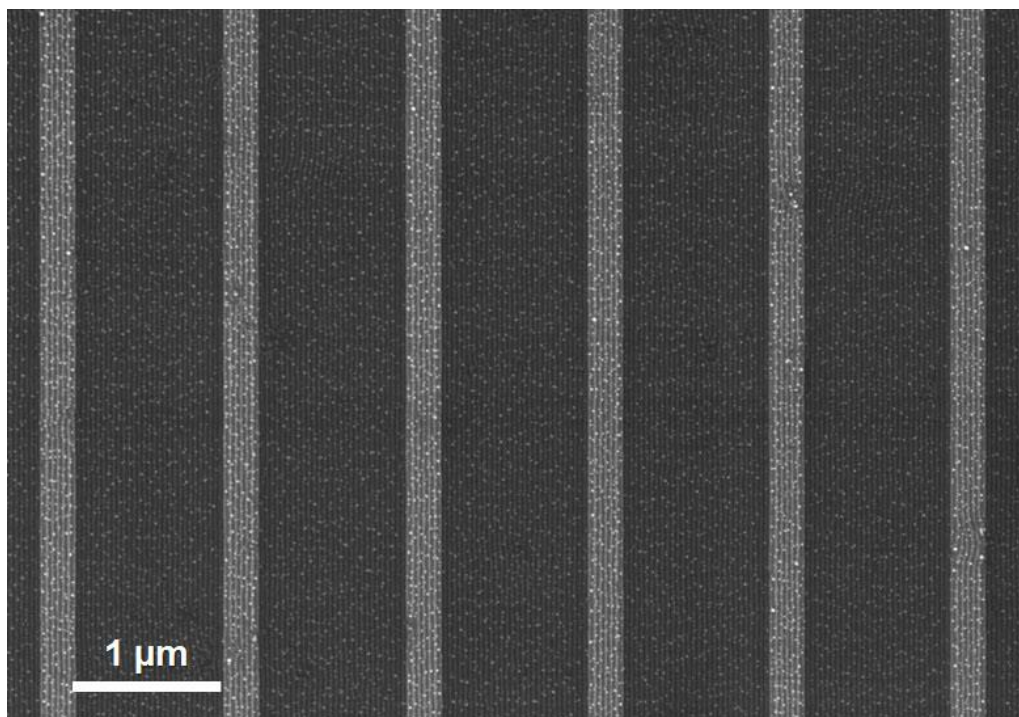


Fig. S4 Rapidly formed 12-nm line pattern of SV42 BCP over the large area using mixed solvents of pyridine and toluene ($V_{\text{PYR}}/V_{\text{TOL}}=1$).

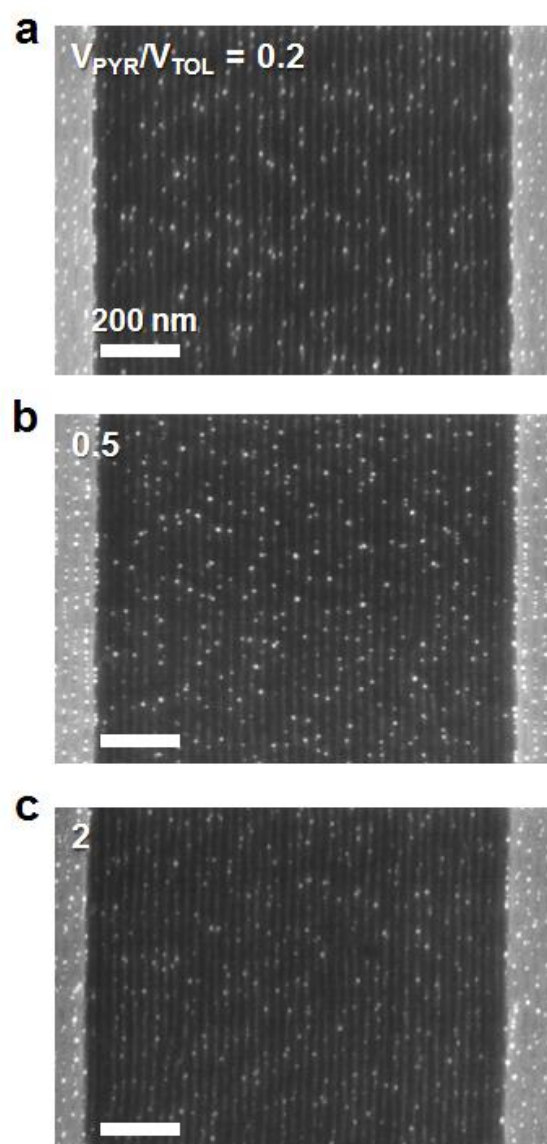


Fig. S5 Rapid 6-nm-line pattern-formation of SV34 BCP depending on the $V_{\text{PYR}}/V_{\text{TOL}}$ ratio for 5 min. (a) $V_{\text{PYR}}/V_{\text{TOL}} = 0.2$, (b) 0.5, (c) 2.0.

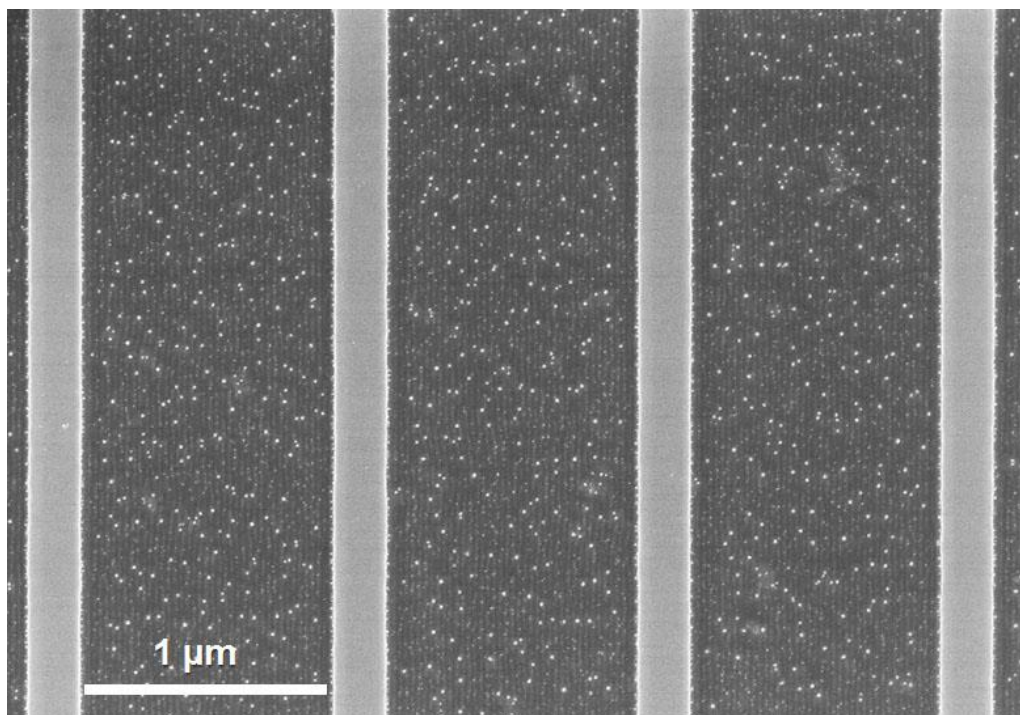


Fig. S6 Rapidly formed 6-nm line pattern of SV34 BCP over the large area using mixed solvents of pyridine and toluene ($V_{\text{PYR}}/V_{\text{TOL}}=0.2$) for 5 min.

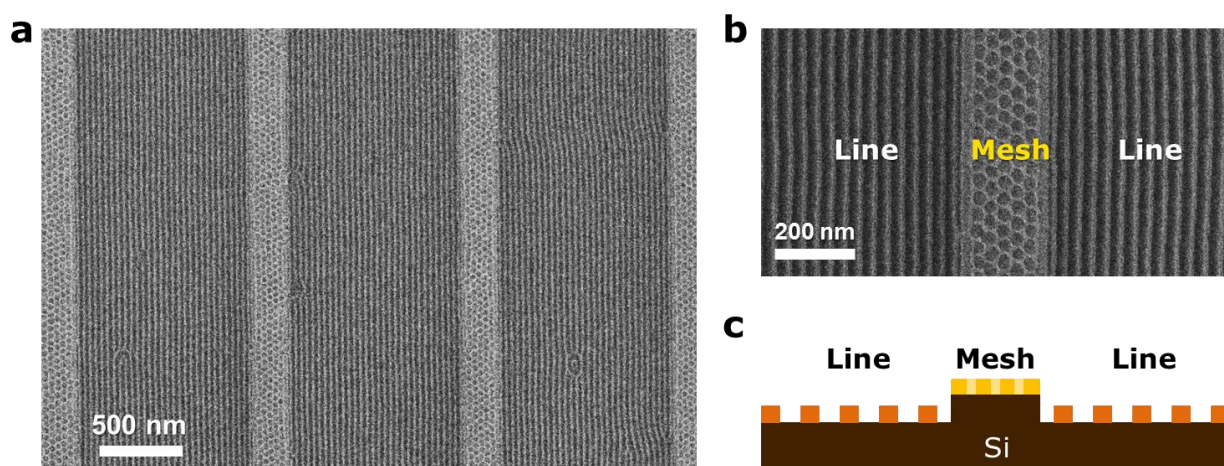


Fig. S7 The comparison of the self-assembled nanostructures of lines within the trench and holes on mesa region. (a) Line and hole binary structures of SV42 BCP with 1.2 wt% formed on the with Si substrates with line and space trenches, (b) Magnified SEM image of (a), (c) Schematic diagram for the cross-sectional SEM image of (a & b).