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

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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_{PYR}/V_{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 ($V_{PYR}/V_{TOL} = 0.2$) 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).