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Supplementary Information

Fabrication of Sub-20 nm Patterns using Dopamine Chemistry in Self-Aligned Double Patterning

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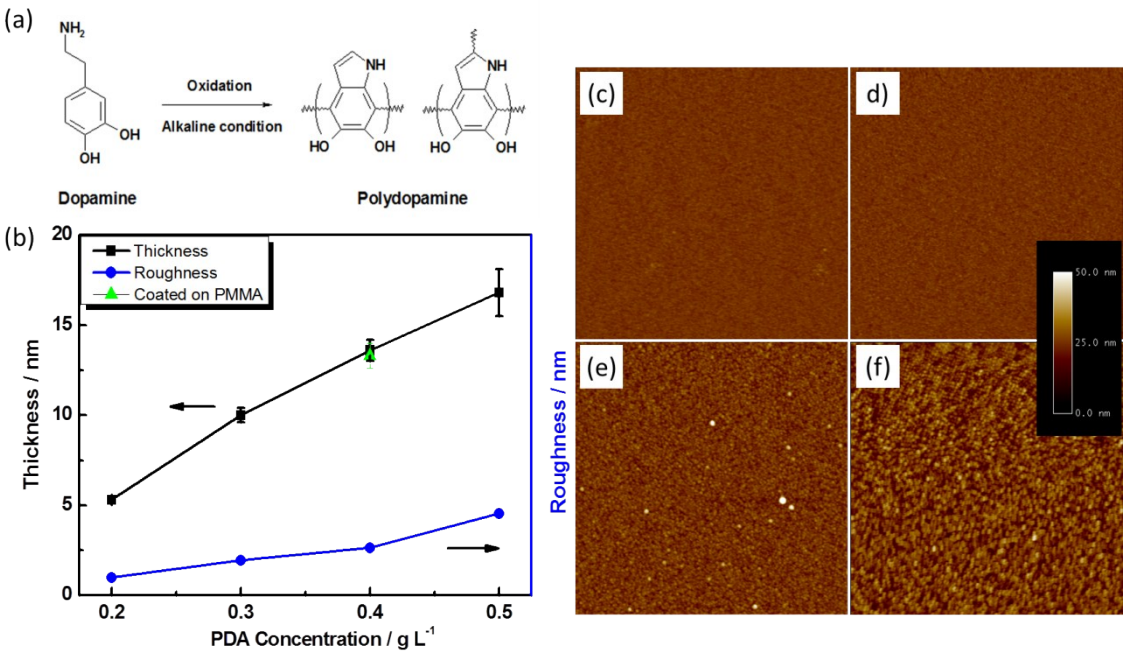

Fig. S1 Polydopamine coatings. (a) Schematic illustration of self-polymerization of dopamine under alkaline conditions; (b) Plot of coating thickness (black squares) and surface roughness (blue circles) of PDA film coated on silicon wafer with respect to dopamine concentration, green triangle is the thickness of PDA coated on PMMA; It is worth noting that the coating thicknesses of film coated on silicon substrate (13.6 nm) or PMMA coated silicon substrate (13.3 nm) are similar to each other (Figure S1b), indicating the coating thickness is independent of substrates in this study; and AFM height images of coated surface with different dopamine concentrations: (c) 0.2 mg·mL^{-1}, (d) 0.3 mg·mL^{-1}, (e) 0.4 mg·mL^{-1} and (f) 0.5 mg·mL^{-1}.

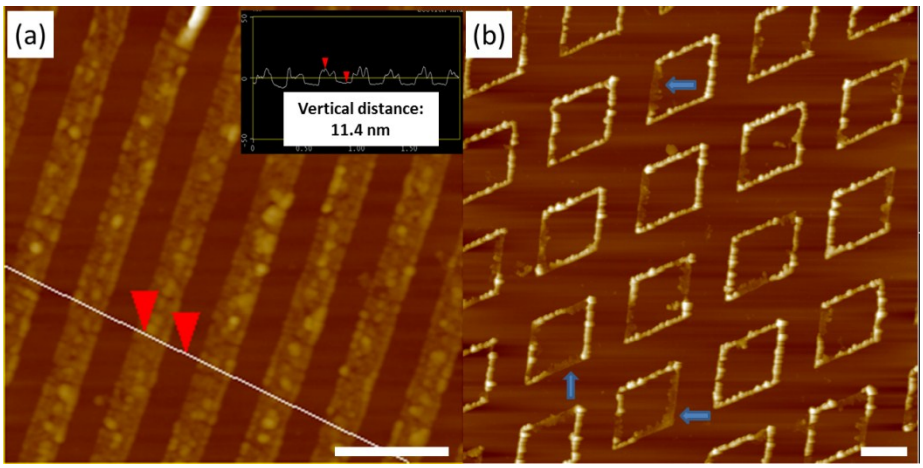

Fig. S2 AFM height images of collapsed (a) PDA line patterns and (b) PDA rhombic patterns achieved after 1 coating cycle and removal of the PMMA template. Inset in (a) is the surface profile of the collapsed line patterns and arrows in (b) indicate the collapsed region of rhombic rings. Scale bars represent 500 nm.

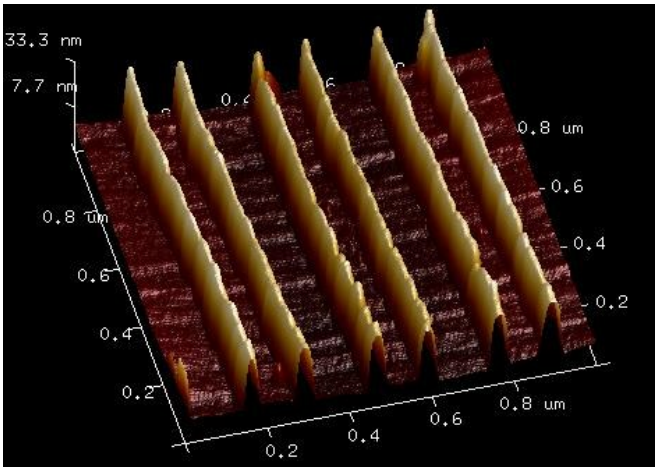

Fig. S3 3D AFM height image of SiO_2 lines after plasma etching.

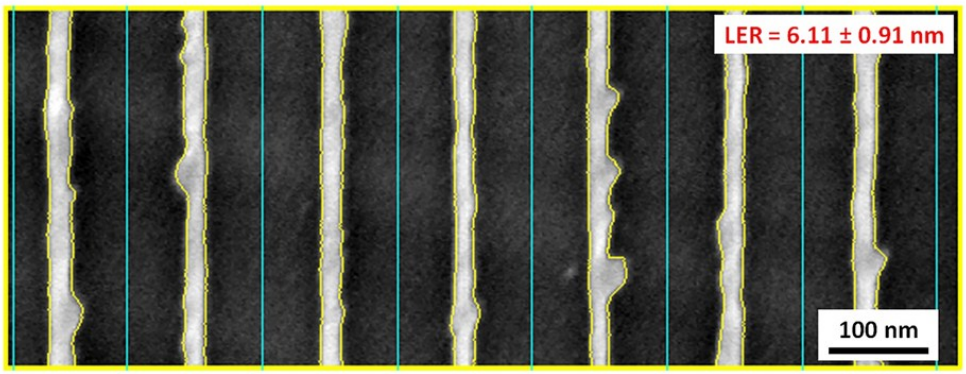

Fig. S4 Measurement of line edge roughness, analysed by SuMMIT software.

Table S1 Comparison of etching rate of PDA, PMMA, and silicon dioxide. Etching condition: O_2 plasma etching (pressure: 4 mTorr, power: 40 W, O_2 flow rate: 50 sccm); CHF_3 plasma etching (pressure: 5 mTorr, power: 150 W, CHF_3 flow rate: 10 sccm).

Materials	O_2 Plasma Etching Rate (nm/min)	CHF_3 Plasma Etching Rate (nm/min)
PDA	15 ± 3	3.7 ± 0.3
PMMA	31 ± 3	4.8 ± 0.4
SiO_2	N/A	9.0 ± 0.3