Capillary liquid bridge soft lithography for micro-patterning preparation based on the SU-8 photoresist templates with special wettability

Huijie Wang [a]*， Xiaoxun Li [b], Kang Luan [b], and Xilin Bai [a]

[a]Multiscale Frontier Physics Research Center, School of Physics and Information Engineering, Shanxi Normal University, Linfen, 041004, P. R. China.

[b]Key Laboratory for Special Functional Materials of Ministry of Education, Collaborative Innovation Center of Nano Functional Materials and Applications, Henan University, Kaifeng 475004, P. R. China

*Corresponding Author Information:

Corresponding author at: Multiscale Frontier Physics Research Center, School of Physics and Information Engineering, Shanxi Normal University, Linfen, 041004, P. R. China.

E-mail address: wanghj@sxnu.edu.cn (Huijie Wang)

Telephone: +86-13522450501

The details for preparing SU-8 photoresist planar film: First, SU-8 photoresist was spin-coated on a polished Si surface at 6000 rpm for 60 s. Then the substrate was baked at 95 ℃ for 3 min. Finally, the film was exposed under UV irradiation for 10 min.

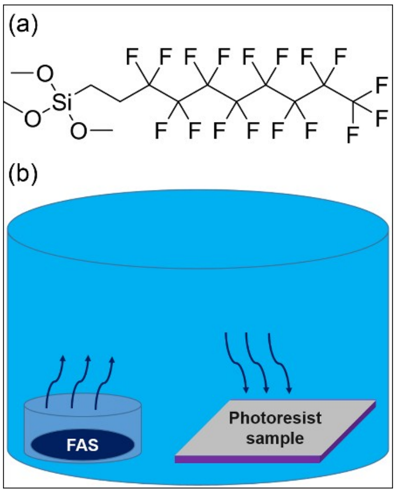

Fig. S1 Low surface modification of photoresist sample by FAS. (a) The molecular structure of FAS; and (b) the modification process using a thermal evaporation method.

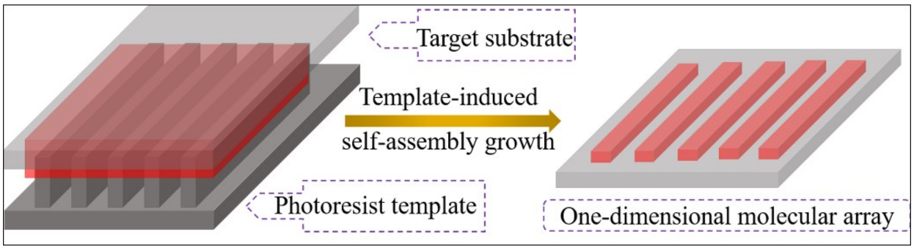

Fig. S2 The schematic diagram of sandwich growth structure for molecular patterning assembly based on the photoresist template.

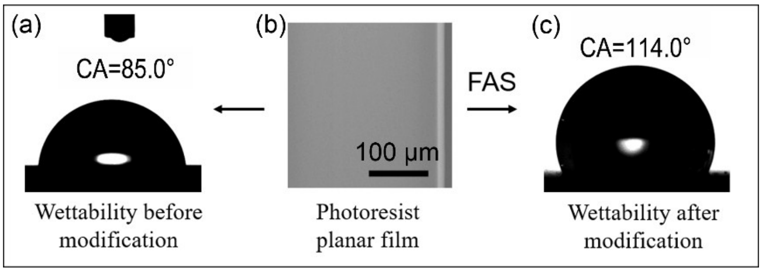

Fig. S3 The surface morphology and the interface wettability of SU-8 planar photoresist film. (a) The wettability of water droplet on the original film; (b) the topography of the film; and (c) the water wettability on the surface of the FAS modified film.

Table S1 The contact angle of a water droplet on the photoresist templates observed from different directions.

Sample（ $a_1 - b_1 - a_2 - b$ ）	Observation along with the pillars	Observation perpendicular to the pillars	Absolute value of contact angle difference
5-10-5-10	140.0°	139.5°	1.0°
5-10-100-25	138.0°	123.0°	15.0°
5-10-200-50	137.0°	121.0°	16.0°
5-10-500-50	136.0°	116.0°	20.0°

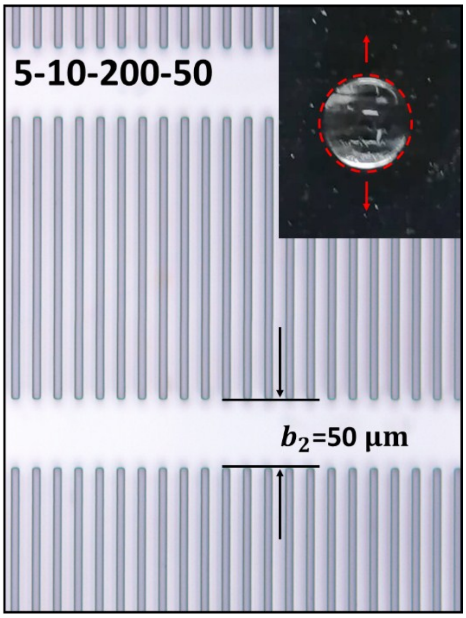

Fig. S4 The optical image of SU-8 photoresist template 5-10-200-50. The inset is the image of water droplet on the template.

The analysis of anisotropic wettability: For the short pillar arrays of the photoresist templates in this study, there exists obvious energy barrier because of the existence of gas gaps, which causes the discontinuity of three-phase contact line when the surface of the template is wetted. Owning to the high aspect ratio of the pillars and the hydrophobic FAS molecules covered on the surface, the wetting state of water droplet on the template is more in line with the Cassie mode. As is known, the apparent contact angle is governed by the topographies in the vicinity of the three-phase line [1-3]. During the wetting process, the three-phase contact line is pinned by the photoresist pillars, and the structural asymmetry of the template caused the divergent droplet frontier observed from different directions.

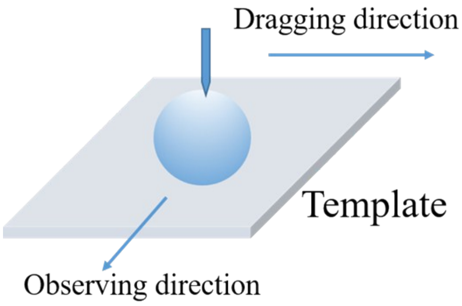

Fig. S5 Schematic diagram of contact angle hysteresis measurement.

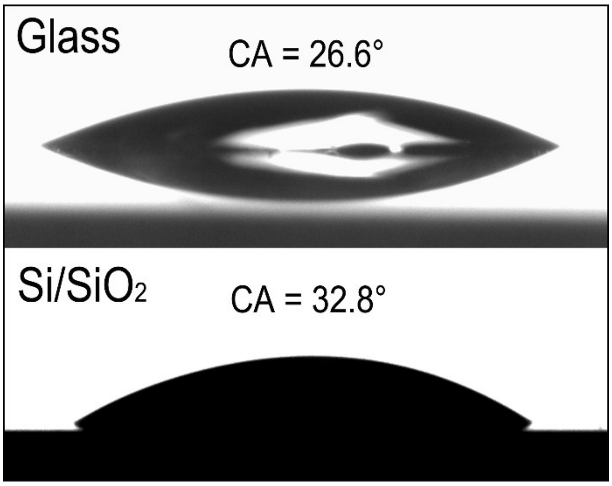

Fig. S6 The surface hydrophilicity of glass and Si/SiO_2 substrates.

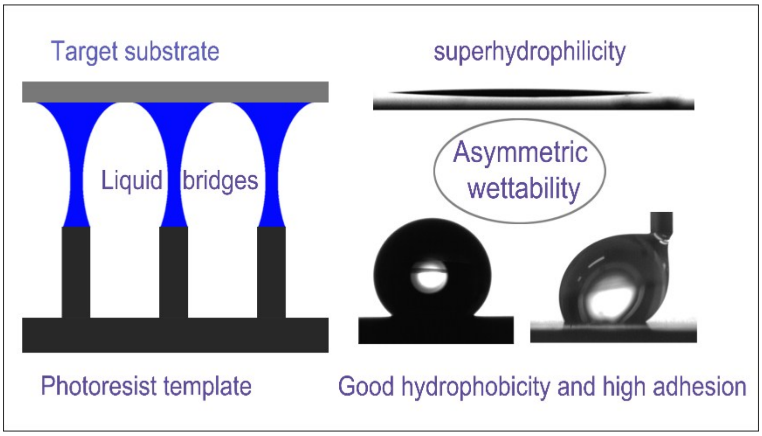

Fig. S7 The schematic diagram of the liquid bridges between a superhydrophilic substrate and a photoresist template with good hydrophobicity and high adhesion.

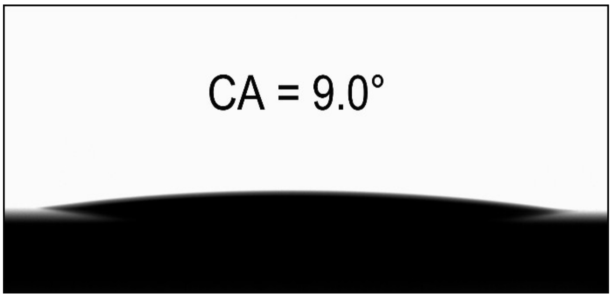

Fig. S8 The contact angle of toluene droplet on the surface of SU-8 photoresist template (not modified by FAS).

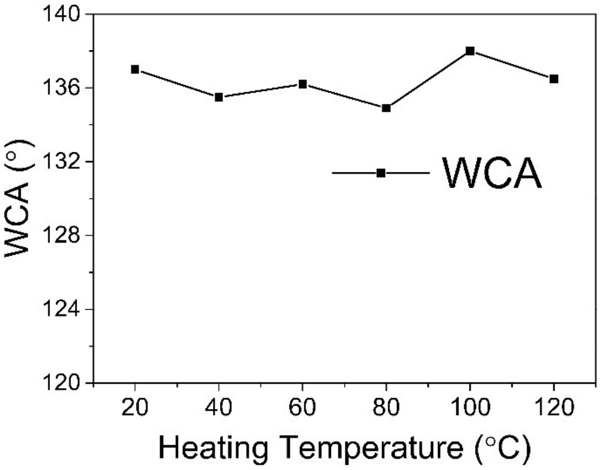

Fig. S9 The thermal stability test for FAS modified SU-8 photoresist template.

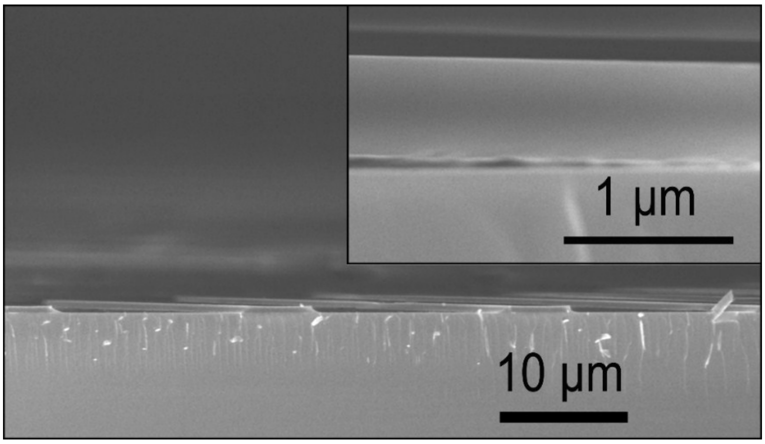

Fig. S10 The SEM side view of Rhodamine line B micron wires. The inset is the cross-section image of single micron wire.

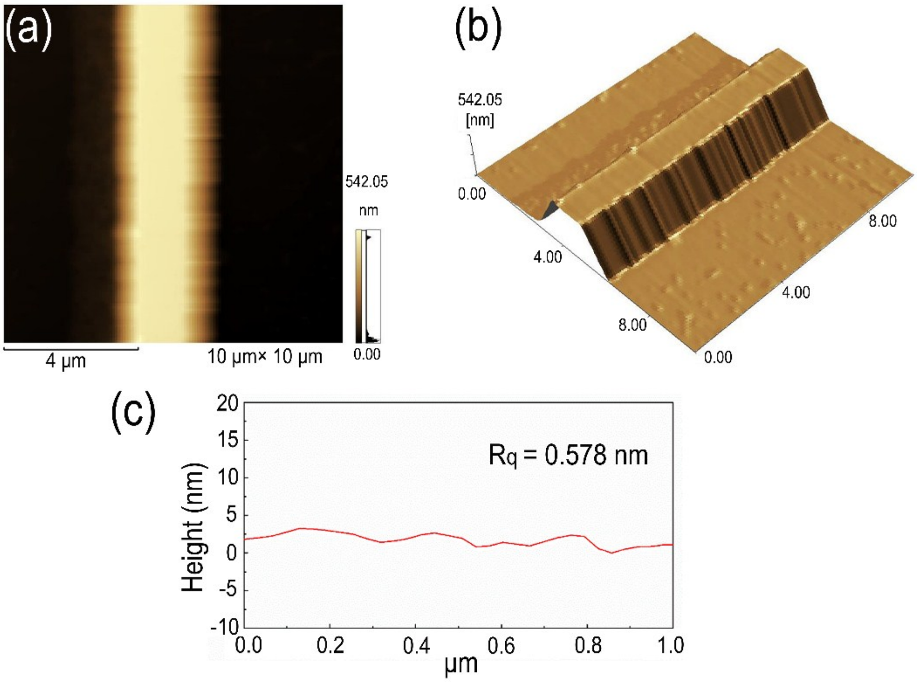

Fig. S11 The AFM test results of the Rhodamine B microwire. (a) The topview; (b) the sideview; and (c) the roughness test on the top of the microwire.

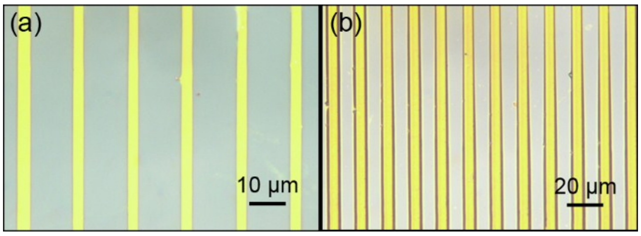

Fig. S12 The optical images of the generated Rhodamine B molecule arrays grown under different solution concentration. (a) The solution concentration is 4 mg $\cdot mL^{-1}$; and (b) the solution concentration is 12 mg $\cdot mL^{-1}$.

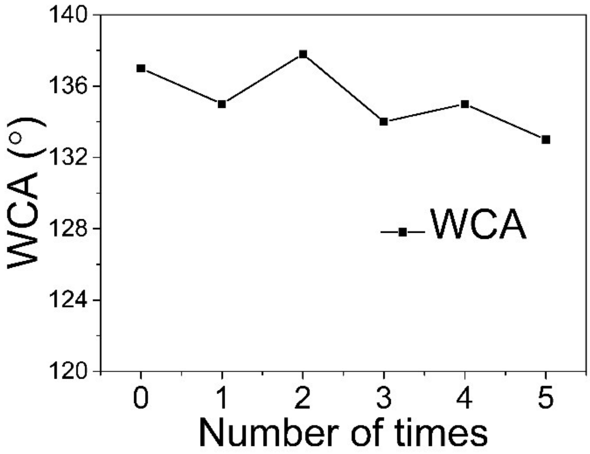

Fig. S13 The good reusability of the SU-8 photoresist template (modified by FAS).

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2. S. T. Larsen and R. Taboryski, *Langmuir*, 2009, **25**, 1282-1284.
3. E. Bormashenko, *Journal of Colloid and Interface Science*, 2011, **360**, 317-319.