

Electronic Supplementary Information (ESI)

Systematic investigation of benchtop surface wrinkling process by corona discharge

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Preparation of wrinkled and non-wrinkled surfaces

PDMS (Sylgard 184, Dow Corning, MI) membranes with 55 mm in length, 10mm in width and 2 mm in thickness were prepared by crosslinking the prepolymer (weight ratio of base to curing agent at 10:1) on a hotplate at 65 °C for 2 h. To generate the nanowrinkled surface, the PDMS substrate was prestrained by 40 %, oxidized by corona discharge for 0.5 min, and removed from the prestrain at an unloading rate of 100 $\mu\text{m/s}$. To generate the microwrinkled surface, the PDMS substrate was prestrained by 5 %, oxidized by corona discharge for 8 min, and removed from the pre-strain at an unloading rate of 100 $\mu\text{m/s}$. Two sets of non-wrinkled surfaces were fabricated as control groups: 1) unstrained PDMS substrate exposed to 0.5 min discharge time; 2) unstrained PDMS substrate exposed to 8 min discharge time.

Measurement of water contact angle

The water contact angle (WCA) was measured using the sessile drop technique by ramé-hart goniometer (Model 200, ramé-hart instrument co., NJ) at room temperature. After the sample mounting stage was leveled, a deionized water droplet (about 1 μl) was deposited on the substrate using a micro-syringe. The droplet was allowed to reside on the surface for 5 min before the measurement of static equilibrium WCA by DROPimage Advanced. WCAs on nanowrinkled and microwrinkled surfaces were measured parallel and orthogonal to the longitudinal direction of the sinusoidal grooves. For the unstrained substrate, WCAs were measured in two orthogonal directions. Each WCA reported in **Table S1** was the average of 10 readings taken at different locations on each substrate.

Table S1 Water contact angle measurement

	Parallel (//)	Orthogonal (\perp)
Unstrained surface ($t=0.5\text{min}$)	$49.8^\circ \pm 1.0^\circ$	$50.6^\circ \pm 0.7^\circ$
Nanowrinkled surface ($t=0.5\text{min}$, $\varepsilon=40\%$)	$82.8^\circ \pm 1.0^\circ$	$106.4^\circ \pm 0.8^\circ$
Unstrained surface ($t=8\text{min}$)	$30.1^\circ \pm 1.5^\circ$	$28.3^\circ \pm 2.2^\circ$
Microwrinkled surface ($t=8\text{min}$, $\varepsilon=5\%$)	$90.1^\circ \pm 1.2^\circ$	$116.1^\circ \pm 1.5^\circ$

Note: t denotes discharge time; ε denotes the amount of pre-strain.

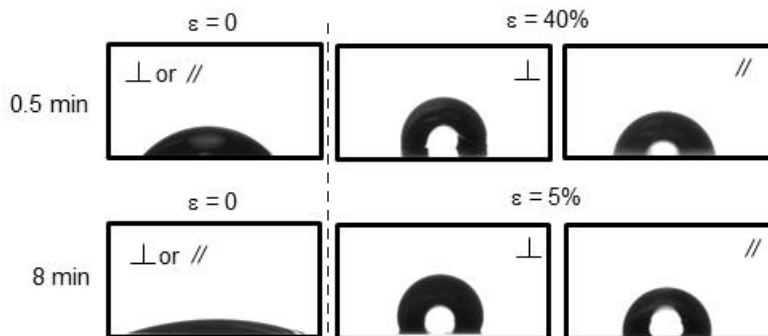


Fig. S1 Images of water droplet shape in two perspectives-parallel (//) and orthogonal (\perp)-on unstrained substrates, nanowrinkled substrate and microwrinkled substrate.