Supporting Information

Design and High-Resolution Characterization of Silicon Wafer-like Omniphobic Liquid Layers Applicable to Any Substrate

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Table S1. Advancing and receding contact angles (CA) for various concentrations of 1,3-dichlorotetramethyldisiloxane in solution-phase in ethanol, and temperatures in vapor-phase, deposited on bare glass slides.

Coating method	Advancing CA, θ_A [°]	Receding CA, θ_R [°]
Solution, 2 w%	98	86
Solution, 5 w%	99	89
Solution, 7 w%	99	87
Solution, 10 w%	99	87
Vapor, 22°C	106	98
Vapor, 30°C	105	97
Vapor, 40°C	107	98
Vapor, 50°C	109	95
Vapor, 60°C	109	96

Table S2. Thickness of the silica layer for various solution aging times, after deposition and curing on bare glass.

Aging time [days]	Thickness [nm]
1	51 ± 10
2	79 ± 7
5	118 ± 5
8	149 ± 8
15	289 ± 7
25	489 ± 11
30	Gelation

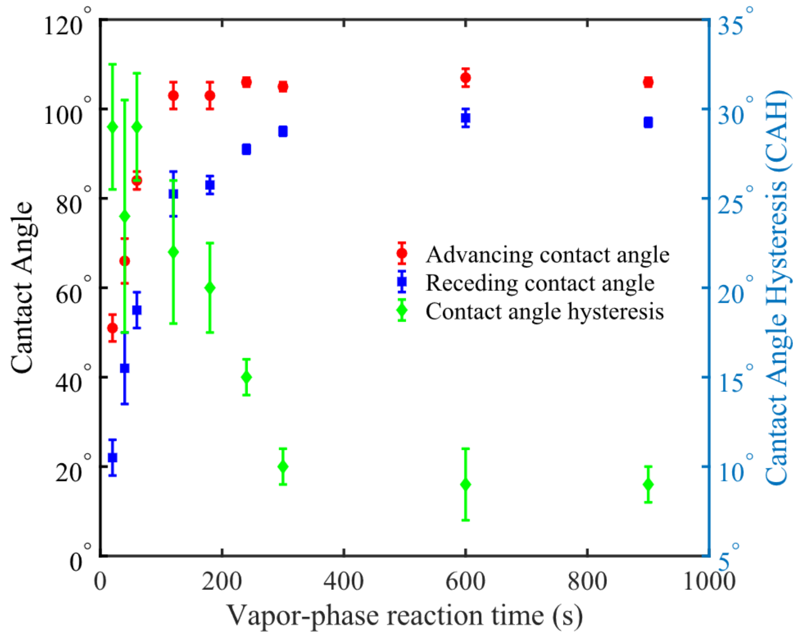

Figure S1. Advancing and receding contact angles of glass (no silica layer) exposed to 1,3-dichlorotetramethyldisiloxane in vapor-phase, from 10 seconds to 15 minutes of reaction time.

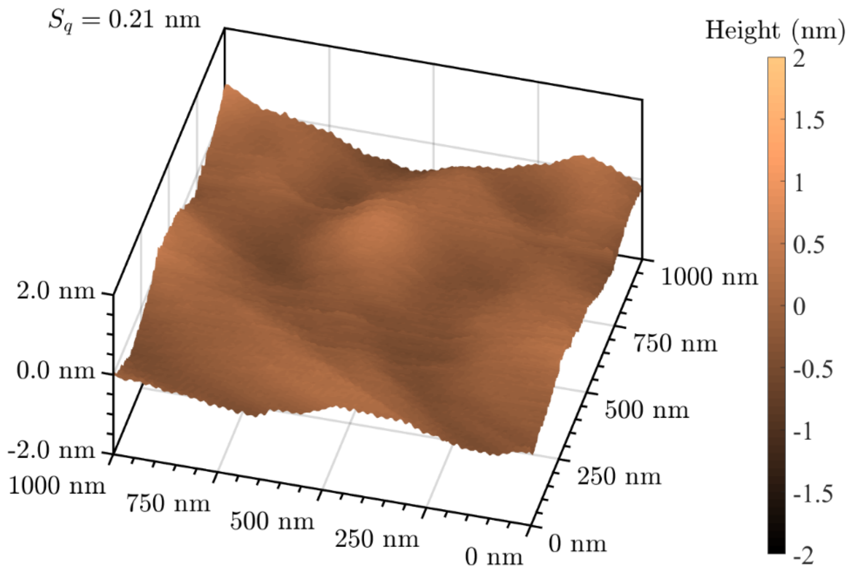

Figure S2. AFM heightmap of a bare silicon wafer.

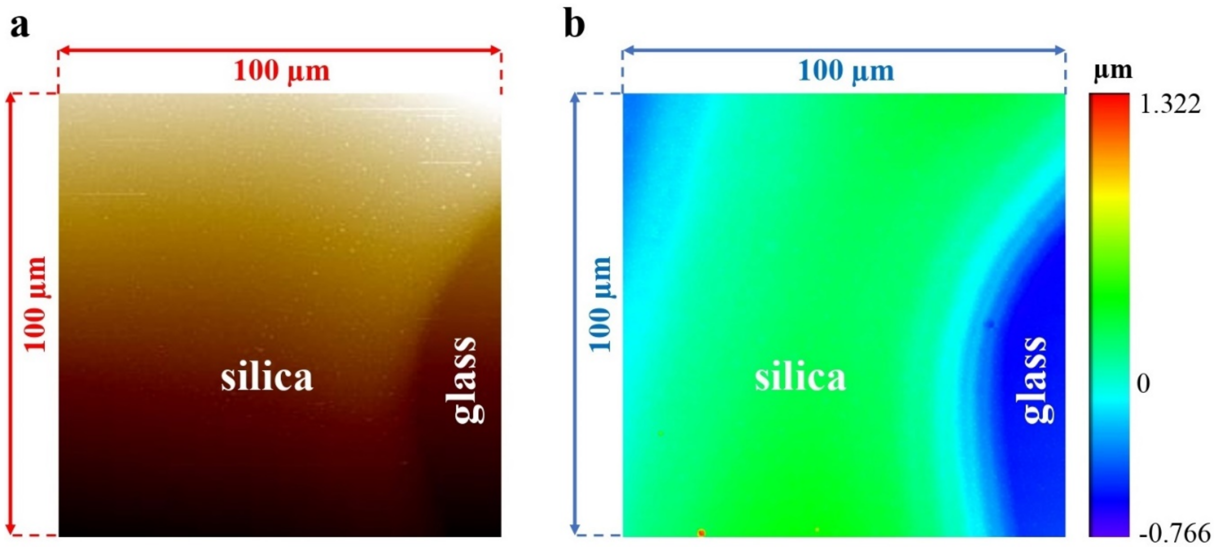

Figure S3. (a) AFM imaging of the boundary between the silica layer and uncoated glass. (b) 3D scanning laser microscope heightmap of the same boundary between silica/glass.

Statistical analysis: Error propagation for independent variables was investigated for the term $y = (2\gamma D_{\mathrm{TCL}})(\pi\rho g\sin\omega)^{-1}$, the y-axis for Figure 2a, to find the error of each data point for the different liquids as,

$$\sigma_y = \sqrt{\left(\frac{\partial y}{\partial D_{\mathrm{TCL}}}\right)_\omega^2 \sigma_{D_{TCL}}^2 + \left(\frac{\partial y}{\partial \omega}\right)_{D_{\mathrm{TCL}}}^2 \sigma_\omega^2}$$

where σ_i represents the standard error of each variable *i*. Recall D_{TCL} is the diameter of the contact line, ω is the tilt angle, V is the droplet volume, and $\bar{\theta}$ is the average contact angle, for which we assume $\bar{\theta} \approx \theta_s$ for omniphobic surfaces. A thermometer located near the goniometer stage allowed for an accurate lookup of each liquid's surface tension and density, and as such their error was negligible. Error in the calculated contact line length (Equation 2) was similarly found using,

$$\sigma_{D_{\mathrm{TCL}}} = \sqrt{\left(\frac{\partial D_{\mathrm{TCL}}}{\partial \bar{\theta}}\right)_V^2 \sigma_{\bar{\theta}}^2 + \left(\frac{\partial D_{\mathrm{TCL}}}{\partial V}\right)_{\bar{\theta}}^2 \sigma_V^2}$$

For determining the CAH of each liquid on the coated substrates, the term $(\cos\theta_R - \cos\theta_A)^{-1}$ was found by calculating the slope, *m*, of $(2D_{\mathrm{TCL}}\gamma)[\pi\rho g\sin\omega]^{-1}$ versus V using a linear regression,

$$m = \frac{1}{\Delta}\left(\sum\frac{1}{\sigma_i^2}\sum\frac{x_i y_i}{\sigma_i^2} - \sum\frac{x_i}{\sigma_i^2}\sum\frac{y_i}{\sigma_i^2}\right)$$

with,

$$\Delta = \sum\frac{1}{\sigma_i^2}\sum\frac{x_i^2}{\sigma_i^2} - \left(\sum\frac{x_i}{\sigma_i^2}\right)^2.$$

Here the total error associated with each data point (x_i,y_i) in Figure 2a is σ_i.

The uncertainty of the slope, σ_m, was then calculated using,

$$\sigma_m = \sqrt{\frac{1}{\Delta}\sum\frac{1}{\sigma_i^2}}$$

Movie Caption

Movie S1. Liquid repellency of SWOLL rough aluminum (initial S_q = 590 nm). Water (30 μL), dimethylformamide (25 μL), diiodomethane (10 μL), hexadecane (8 μL), dodecane (6 μL), and perfluorodecalin (2 μL) droplets easily slide from the SWOLL surface at a tilt angle of ω = 15°.