

Electronic Supplementary Material (ESI)

A novel microstructure inspired from *Nepenthes alata* and lizard skin and its enhanced uni-directional liquid spreading property

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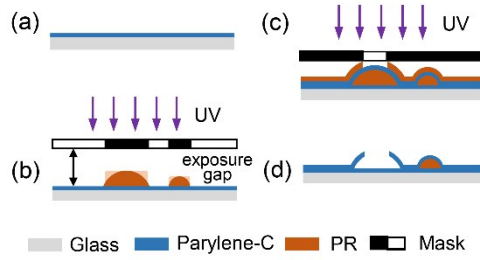


Figure S1- Fabrication process of surface microstructure. (a) Deposition of first Parylene layer on glass substrate. (b) Formation of PR sacrificial layer with enlarged EG. (c) Deposition of second Parylene layer and formation a PR etching mask with standard EG. (d) Etching Parylene with oxygen plasma and releasing sacrificial layer in acetone.

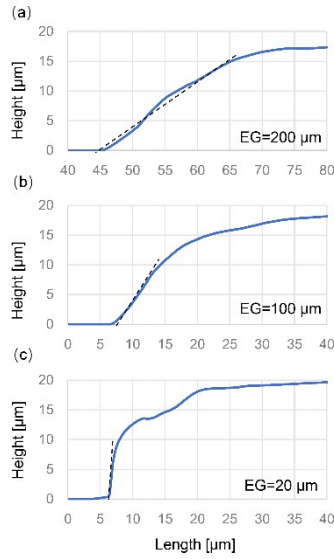


Figure S1- Interior corner angles of interior corner (β) measured by a step profiler. As exposure gap (EG) declines, the interior corner angle increases inversely. The specific data is provided in Table S1.

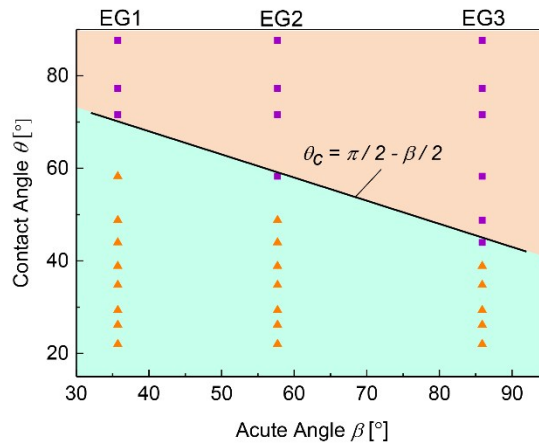


Figure S3- Results of the moment when the precursor appears in different experiment conditions. Purple squares represent that the precursor does not appear, while orange triangles represent that the precursor film appears. The straight line and the filled below represent the area of inequation (3).

Table S1 Exposure gap (EG) and corresponding interior corner angle (β)

Exposure Gap (EG) [μm]	Interior corner Angle (β) [degree]
250 ^{a)}	35.7 ^{b)}
100	57.7
20	85.9

^{a)}Experiments parameters; ^{b)} Measured values

Video Captions

Video 1: Liquid spreads on the biomimetic structure on a flat substrate.

A 4 μ L liquid (alcohol + DI water solution) is deposited on the biomimetic structure. The droplet spreads uni-directionally at a high speed.

Video 2: Liquid spreads on the microstructure with flared grooves on an oblique substrate.

A 4 μ L liquid (alcohol + DI water solution) is deposited on the microstructure with flared grooves. The substrate is placed at a tilt angle of 20°. The droplet spreads upwards and the backward leaking is negligible.

Video 3: Liquid spreads on the microstructure without flared grooves on an oblique substrate.

A 4 μ L liquid (alcohol + DI water solution) is deposited on the microstructure without flared grooves. The same substrate is placed at a tilt angle of 20°. The droplet spreads bidirectionally, which means the film loses the property of uni-directional liquid spreading.