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Supplementary Information

Uni-directional Liquid Spreading Control on Bio-inspired Surface from the Peristome of *Nepenthes alata*

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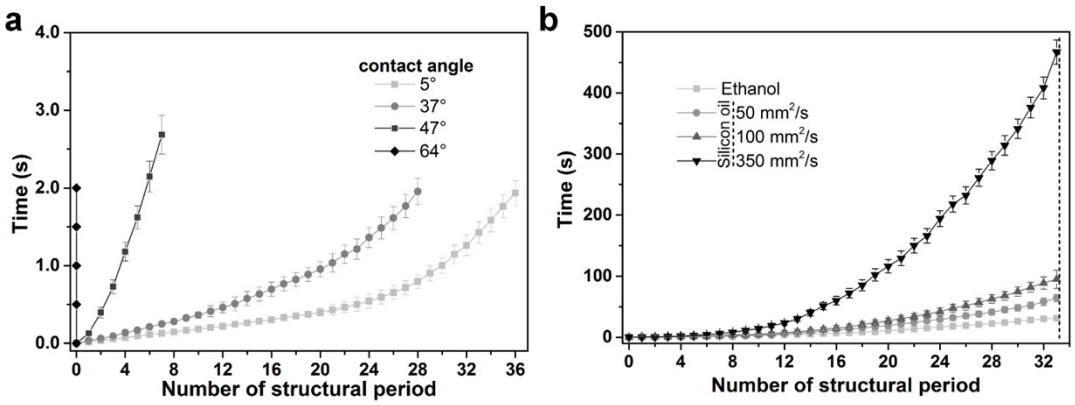

Fig. S1 Water Uni-directional spreading on surface structure with different (a) surface wettability and (b) viscosity. Time needed for liquid spreading pass structural periods with different surface contact angle.

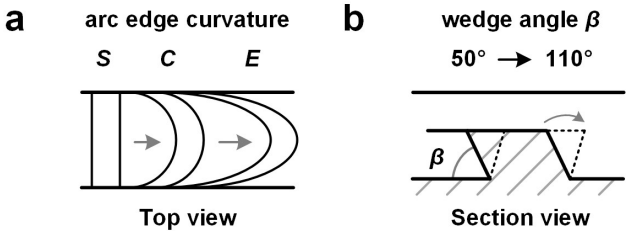

Fig. S2 Two main structural features. (a) curvature of arc edge includes straight (*S*), circle arc (*C*) and ellipse arc (*E*). (b) wedge angle of microcavity *β* ranging from about 50° to 110°.

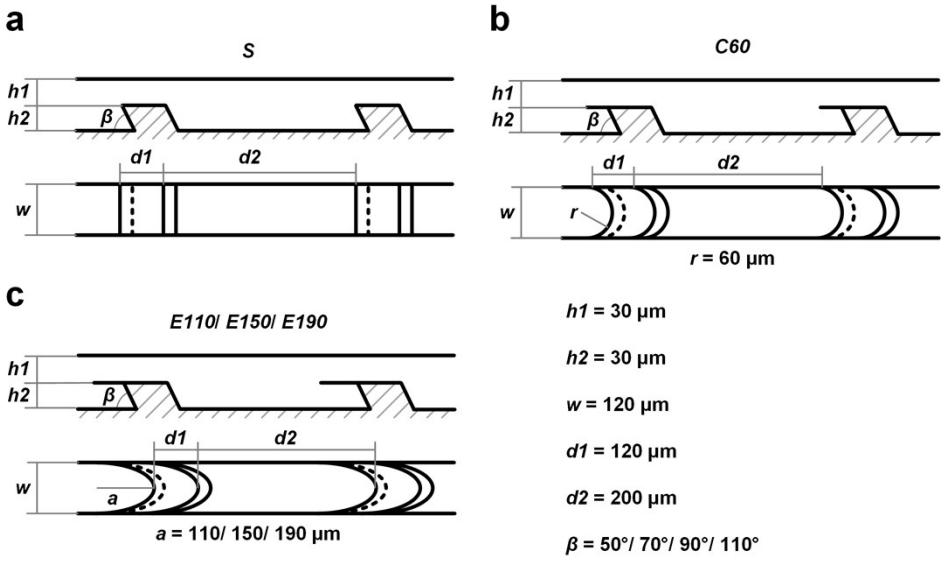

Fig. S3 The size of surface structures. (a) straight, (b) circle arc and (c) ellipse arc. The pit inclined angle *β* for all types of arc edge curvature include 50°, 70°, 80° and 110°. The width of each groove *w* in all types of surface structures is approximately 120 μm. The depth of overlaid grooves *h1* and pits *h2* are both about 30 μm. The length of each stage *d1* between pits is 120 μm. The length of each pit *d2* is 200 μm. The radius of circle arc *r* is 60 μm. The semi-major axis length of ellipse arc *a* contains 110, 150 and 190 μm.

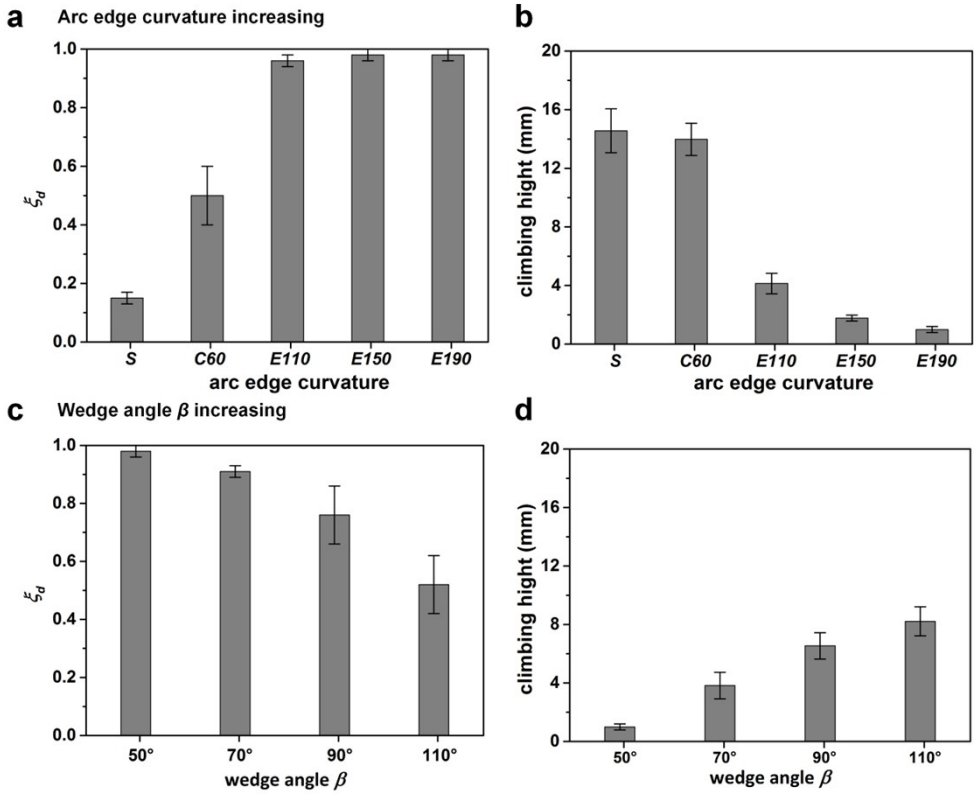

Fig. S4 The anisotropic liquid spreading factor ξ_d and liquid climbing height in different surface structures. With arc edge curvature growing, liquid spreading factor ξ_d increases (a), and the

climbing height of five surface structures decreases (b) with front direction vertically immersed into liquid. With microcavity wedge angle β growing, liquid spreading factor ξ_d reduces (c), and the climbing height of five surface structures rises (d) with front direction vertically immersed into liquid.

Video S1. Liquid spreading on surface structures with different arc edge curvature.

Video S2. Liquid spreading in surface structures with different microcavity wedge angle β.

Video S3. Pinning failure happened on surface structure with small arc edge curvature (*C60*, β = 50°) and large wedge angle β (*E190*, β= 110°).