

Supplementary Information

Fishbone-inspired liquid splitter enables droplets directional transportation and spontaneous separation

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This file contains **6** supporting figures and **6** movies.

Supporting Figures:

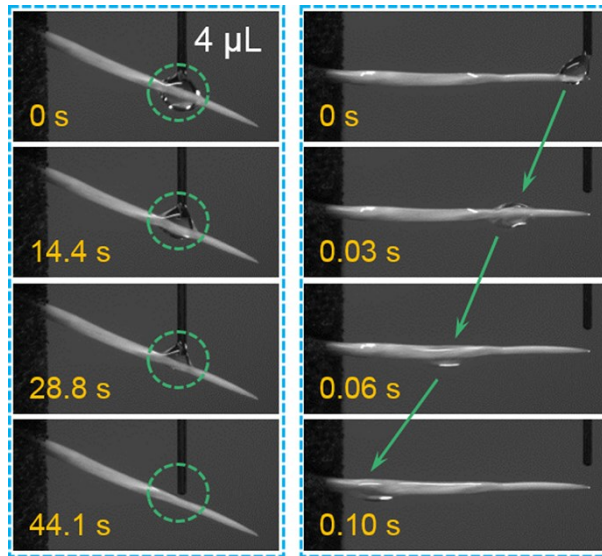


Figure S1. Time-lapse images of ultrafast directional transportation of octane droplets (4 μL) from the middle to the base on the tilting FSLLS and from tip of the horizontal FSLLS to its base.

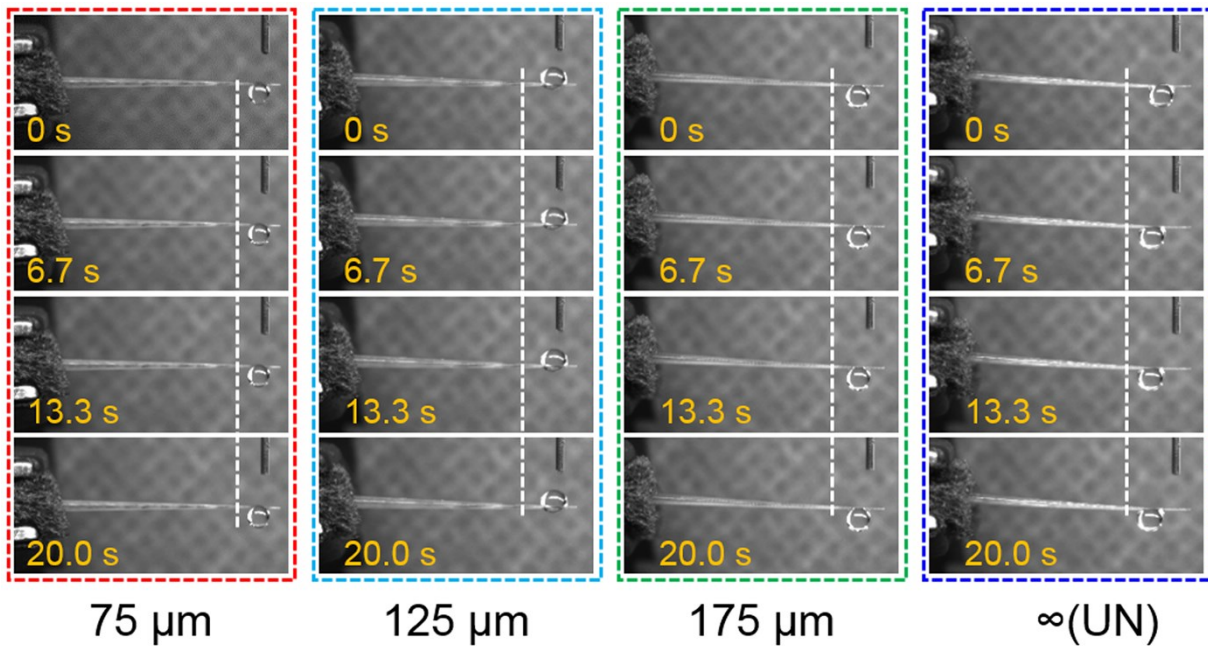


Figure S2. Time-lapse images of the failed transportation of ethylene glycol droplets on the FSLLS with the micro-pit center spacings of 75, 125, 175 μm and ∞ (∞ equals to that without micro-pit, UN).

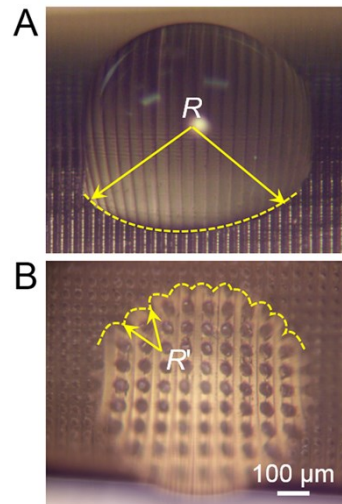


Figure S3. Three-phase contact line of the microdroplet on **(A)** 3D printing spines and **(B)** FSLLS, the local radii $R > R'$.

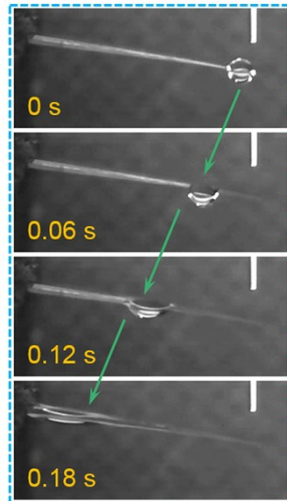


Figure S4. Time-lapse images of ultrafast directional transportation of octane droplets from tip of the tilting 3D printing spine to its base.

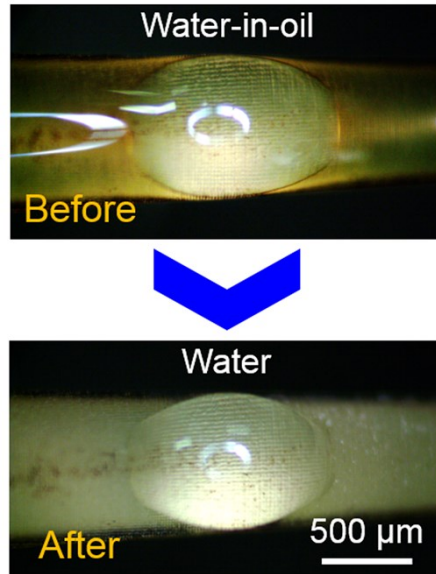


Figure S5. Time-lapse images of the separation process of water-in-oil mixture droplets on the FSLLS, no oil phase is present in the residual water droplets.

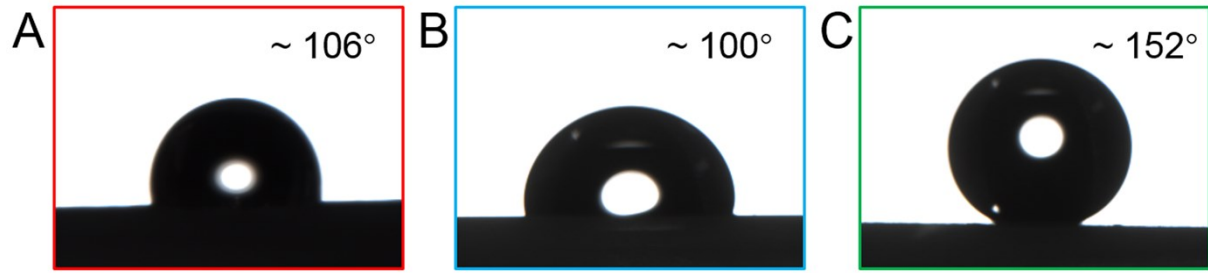


Figure S6. The water contact angles of three samples, involving **(A)** natural medullary spines, **(B)** 3D printing spines showing hydrophobicity and **(C)** FSLLS with super-hydrophobicity property.

Supplementary movies:

Movie S1. The oil droplets (octane 2 μL) could be transported from the tip to the base of the FSLLS at the tilt angles of 0° and 20° .

Movie S2. The collapse of perfluorooctane droplets and the stagnate state of glycerol droplets on the FSLLS.

Movie S3. The directional transportation of oil droplets on the FSLLS with the apex angle of 13° , where a continuous transport failed at the tilt angle of 20° .

Movie S4. After first cycle of the microdroplet transportation, the trapped oil by the micro-pits forms a layer film along the FSLLS, making the following microdroplets transport at a higher speed.

Movie S5. The directional transportation of oil droplets on the spines without micro-pits at a tilt angle of 10° .

Movie S6. Continuous separation processes of the mixed droplets on the assembled devices from one, two and four FSLLSs.