



## Supporting Information

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Energy-Efficient Oil–Water Separation of Biomimetic Copper Membrane with Multiscale Hierarchical Dendritic Structures

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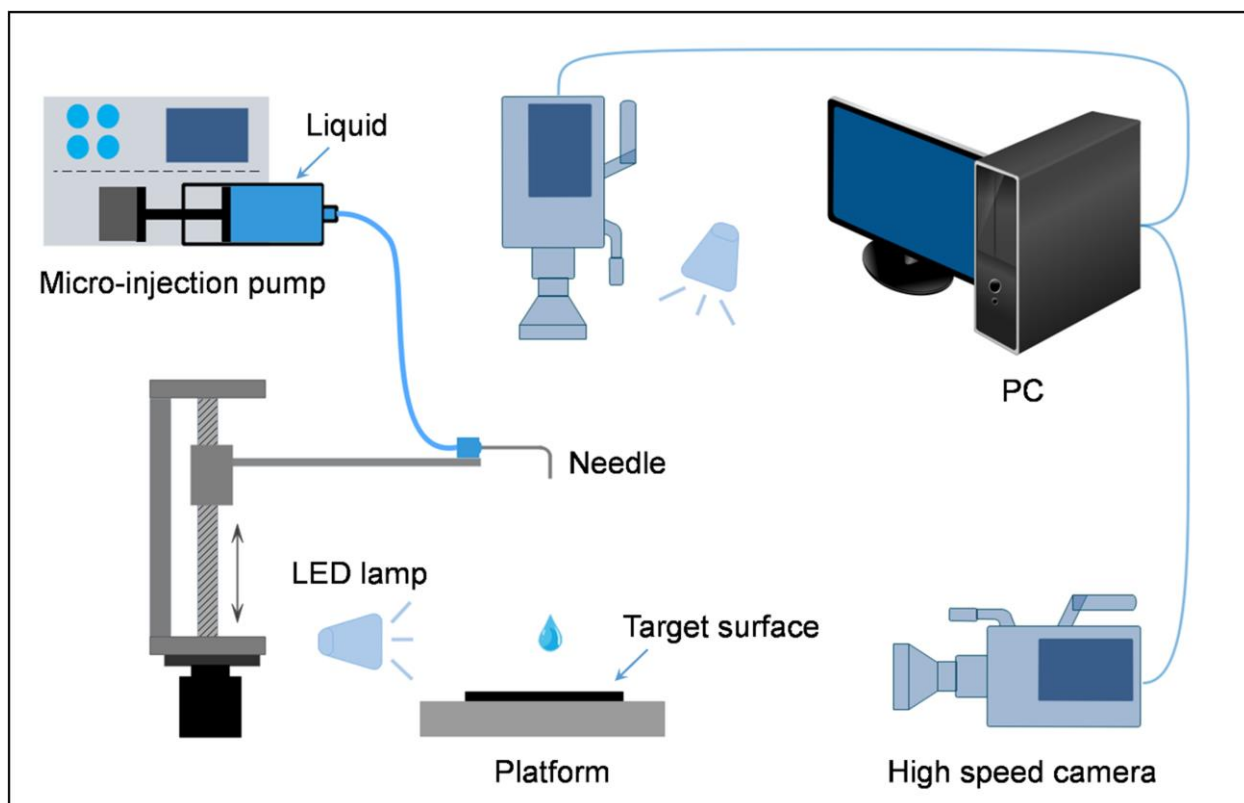
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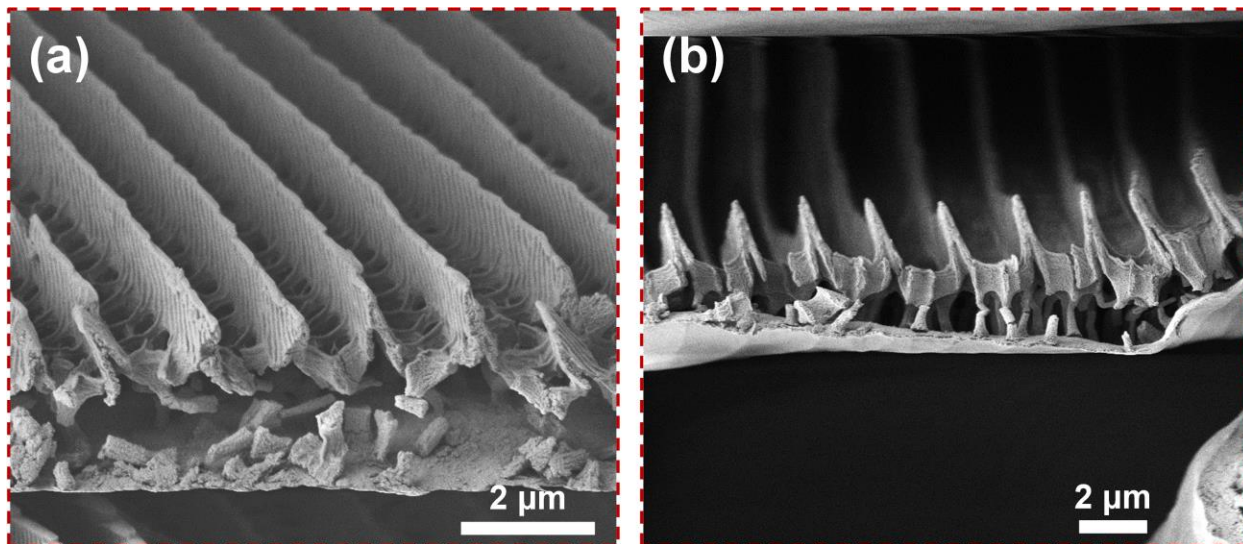
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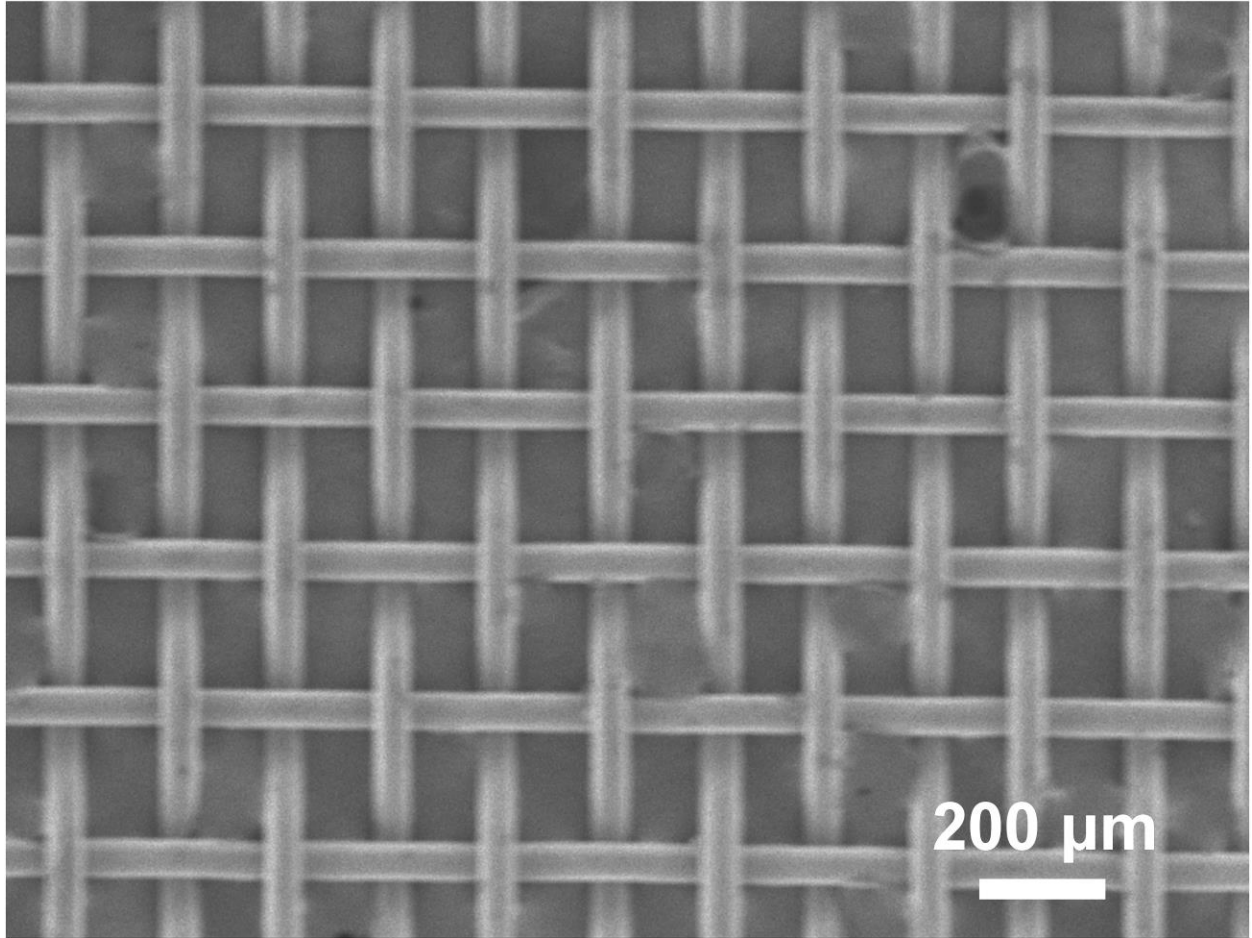
**Video S1.** Superhydrophobic property and self-cleaning process in the water dropping experiment.



**Figure S1.** Schematic of the experimental setup. In the observation of anti-wetting behaviors of butterfly wings and BMCM, a piece of specimen was fixed in the test platform. A series of uniform liquid droplets were generated by using a micro-injection pump to supply test liquids through a stainless steel needle with an inner diameter of 0.6 mm (gauge 23). The dynamic behaviors of the drippy water and oil droplets on butterfly wings and BMCM were observed with the aid of a high-speed camera at 3000 frames/s viewed from the top (using a back illumination technique) and side.

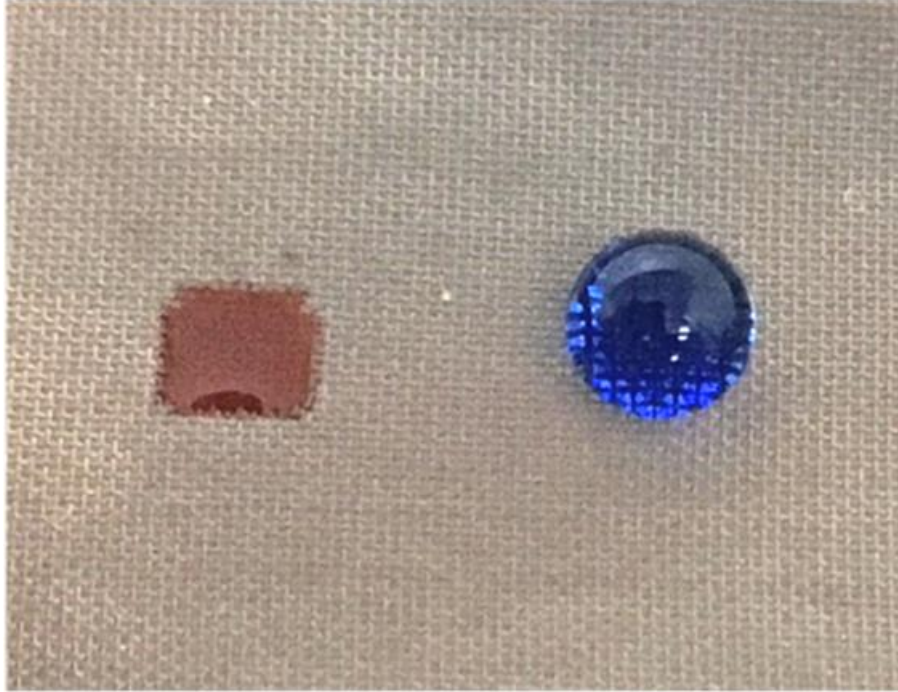


**Figure S2.** FESEM images of SNWF from (a) oblique view and (b) cross section view.



**Figure S3.** FESEM image of stainless steel mesh at low magnification.

**Video S2.** Oil–water separation of the butterfly wing membrane.



**Figure S4.** Wetting behaviors of water and oil on BMCM. Water droplet was dyed blue and oil droplet was dyed red.



**Video S3.** Oil–water separation of the BMCM.

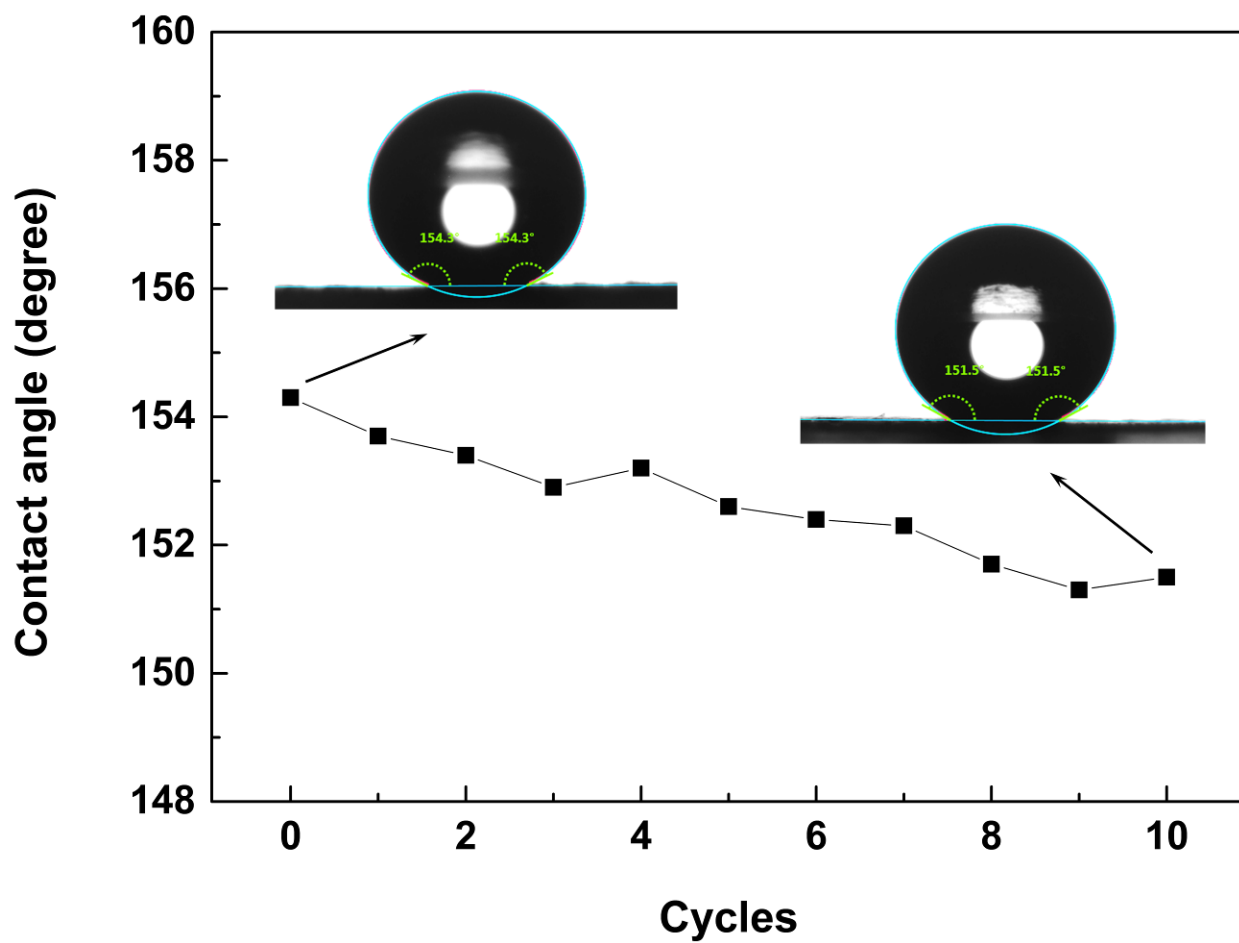
**Video S4.** Water repellency of the BMCM in the water dropping experiment.

**Video S5.** Superoleophilic property and rapid permeating process in the oil dropping experiment.

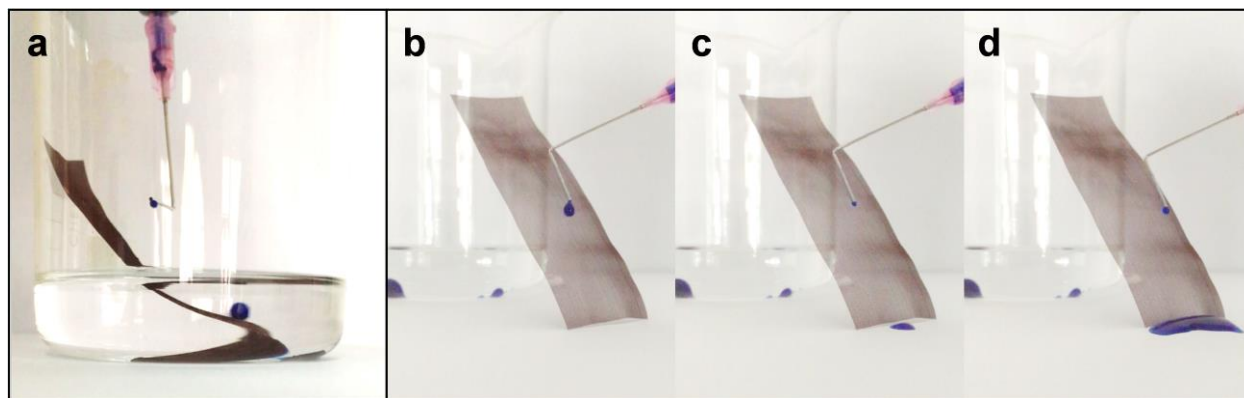
**Table S1.** Oil–water separation tests of the BMC. Here, we chose the same mass compositions of oil–water mixtures (25 g).

Round	Diesel		Gasoline		Chloroform		Hexane		Toluene	
	$G_p$	$R$ (%)	$G_p$	$R$ (%)	$G_p$	$R$ (%)	$G_p$	$R$ (%)	$G_p$	$R$ (%)
1	23.2	93.2	23.5	94	22.8	91.2	23.75	95	23.13	92.5
2	24	96.1	24.1	96.5	23.63	94.5	24.45	97.8	23.88	95.5
3	23.95	95.8	24	96.1	23.38	93.5	24.38	97.5	23.83	95.3
4	23.9	95.6	24	96.1	23.53	94.1	24.45	97.8	23.8	95.2
5	23.8	95.2	24.13	96.5	23.38	93.5	24.25	97	23.78	95.1
6	23.8	95.2	23.88	95.5	23.3	93.2	24.2	96.8	23.7	94.8
7	23.76	95.1	23.95	95.8	23.28	93.1	24.23	96.9	23.68	94.7
8	23.7	94.8	24	96	23.28	93.1	24.28	97.1	23.7	94.9
9	23.6	94.5	23.88	95.5	23.18	92.7	24.13	96.5	23.65	94.6
10	23.58	94.3	23.75	95	23.15	92.6	24.08	96.3	23.63	94.5

\*All oil concentration data were measured using an automatic infrared oil analyzer. Unit of measurement ( $G_p$ ) in the table: g.



**Figure S5.** Variations of water CA of the BMCM in the repeated oil–water separation process.



**Figure S6.** Anti-oil-fouling tests after oil-contaminations. (a) Water droplet was repelled by the BMCM when immersed in oil (cyclohexane). (b, c and d) The BMCM retained its water-repellent property even after being contaminated by oil.

**Video S6.** Water droplet repelled by the BMCM immersed in oil.

**Video S7.** Water-repellent property of the BMCM after being contaminated by oil.