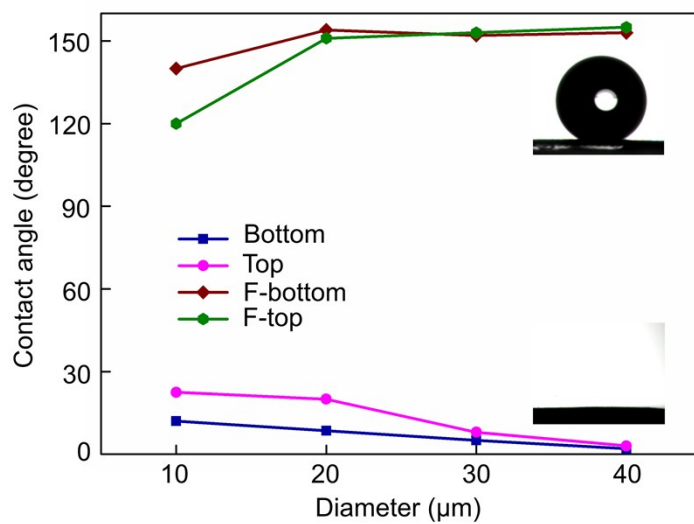
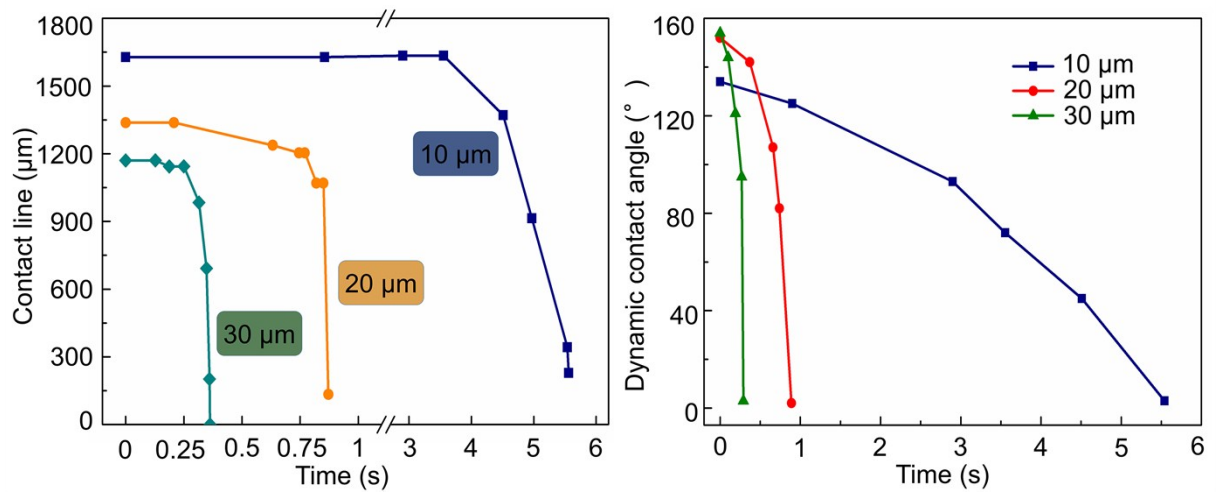


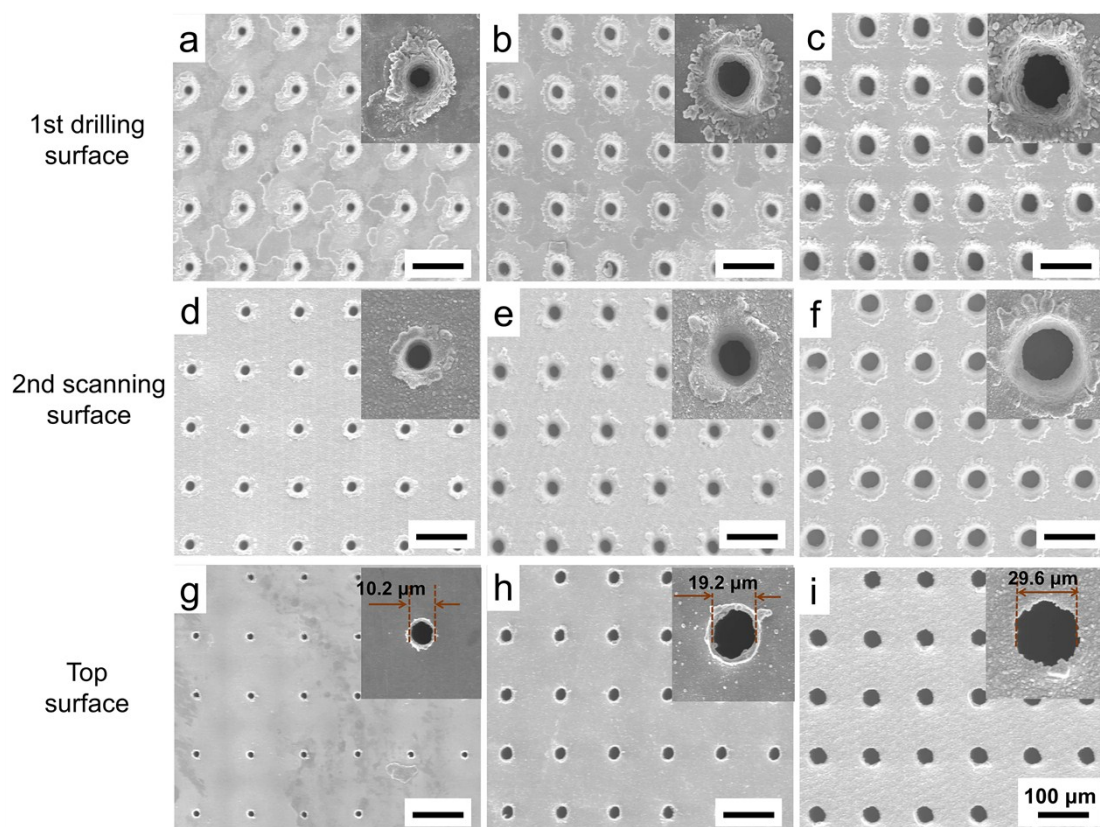
### Supporting Information



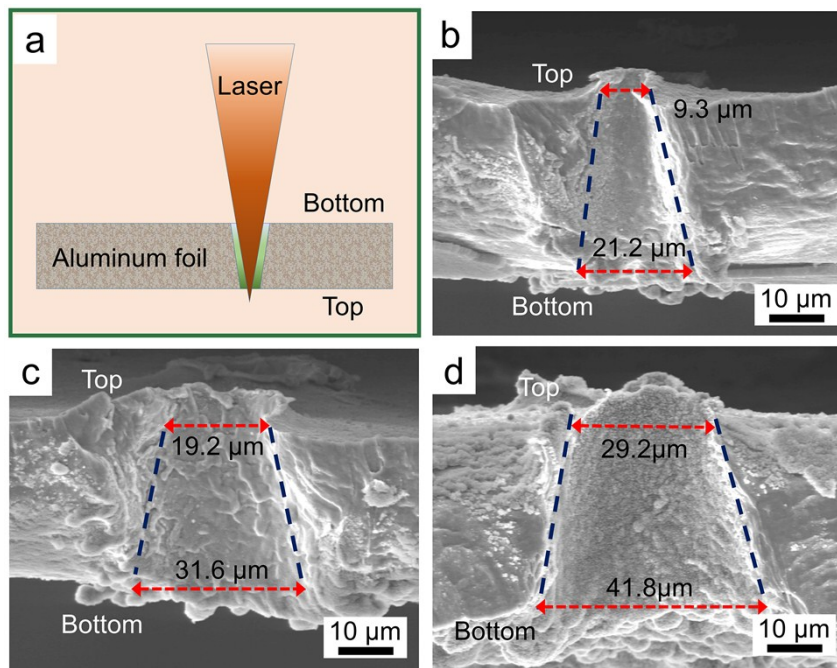
**Figure S1.** The WCAs of superhydrophilic membrane, superhydrophobic membrane with different diameters of micropore.



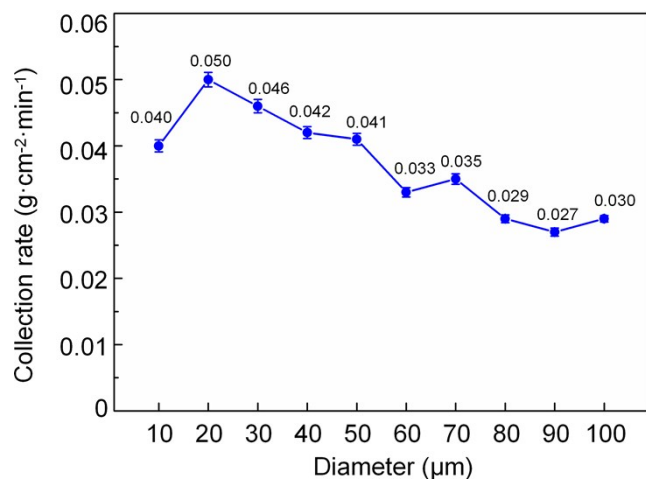
**Figure S2.** The dynamical process of contact line (a) and contact angle (b) when droplet was absorbed from the top surface to the bottom surface with different diameters.



**Figure S3.** The SEM images of bottom surface of first drilled aluminum foil (a - c), bottom (d - f) and top surface (g - i) of Janus membrane with different diameters of micropore. Particular morphology was fabricated by adjusting the laser parameters including power ( $P$ ), exposure time ( $t$ ), the scanning step ( $d$ ) and scanning speed ( $v$ ). For the first drilling, the corresponding parameters from left to right: left ( $P = 60$  mw,  $t = 48$  ms,  $d = 100$   $\mu\text{m}$ ,  $v = 70$  mm/s); center ( $P = 200$  mw,  $t = 24$  ms,  $d = 100$   $\mu\text{m}$ ,  $v = 70$  mm/s), right ( $P = 300$  mw,  $t = 20$  ms,  $d = 100$   $\mu\text{m}$ ,  $v = 70$  mm/s). The bigger micropores arrays can be prepared by laser scanning with circled path. For the second scanning, the corresponding parameters are  $P = 75$  mw,  $t = 1$  ms,  $d = 15$   $\mu\text{m}$ ,  $v = 20$  mm/s



**Figure S4.** The schematic diagram of laser drilling (a) and the SEM images of sectioned conical pore with different diameters (b - d).



**Figure S5.** The collection rates with the different diameter. The related parameters of micropores array was similar to S3 mentioned except number of micropores unit area (cm<sup>2</sup>). And numbers of micropores were set to be 200×200, 100×100, 66×67, 50×50, 40×40, 33×34, 28×29, 25×25, 22×22, 20×20 with the diameters of 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 μm.

**Supporting Information, Movie S1.** The dynamic process that droplet is absorbed into bottom surface of Janus aluminum membrane.

**Supporting Information, Movie S2.** The fog collection ability of Janus membrane compared with traditional ones.

**Supporting Information, Movie S3.** The fog collection process of Janus membrane from side view.

**Supporting Information, Movie S4.** The fog collection rates of fog collection system with Janus membrane compared with traditional ones.