

## Supporting Information

Long Jiao<sup>a, c</sup>, Dingqiang Tan<sup>a</sup>, Yanjun Hu<sup>a, \*</sup>, Yijing Yang<sup>b, \*</sup>, Qianqian Guo<sup>a</sup>,

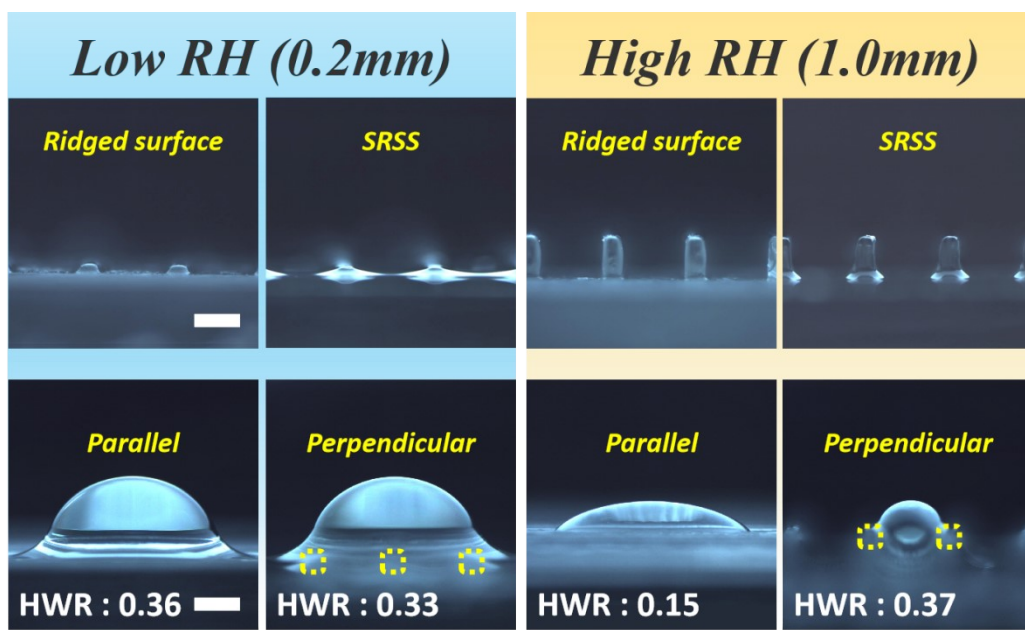
Nan Zhou<sup>a</sup>, Huaping Wu<sup>a</sup>, Chen Chen<sup>a</sup>, Xingang Zhao<sup>c</sup>, Guohua Hu<sup>c</sup>

<sup>a</sup> College of Mechanical Engineering, Zhejiang University of Technology, Hangzhou, 310023, China

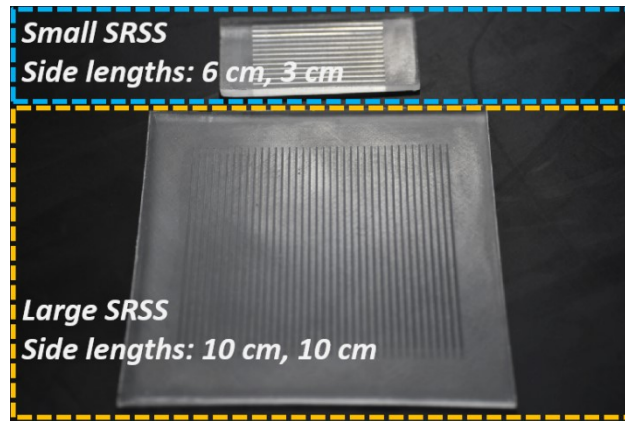
<sup>b</sup> Key Laboratory of Low-grade Energy Utilization Technologies and Systems of Ministry of Education, School of Energy and Power Engineering, Chongqing University, Chongqing, 400030, China

<sup>c</sup> Zhejiang Tuff Development Company, Ltd., Jiaxing, 314400, China

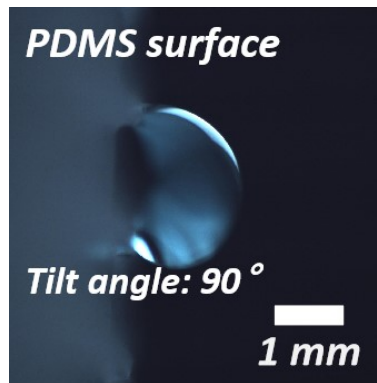
\*Corresponding author. E-mail: huyanjun@zjut.edu.cn (Yanjun Hu), yjyang@cqu.edu.cn (Yijing Yang)



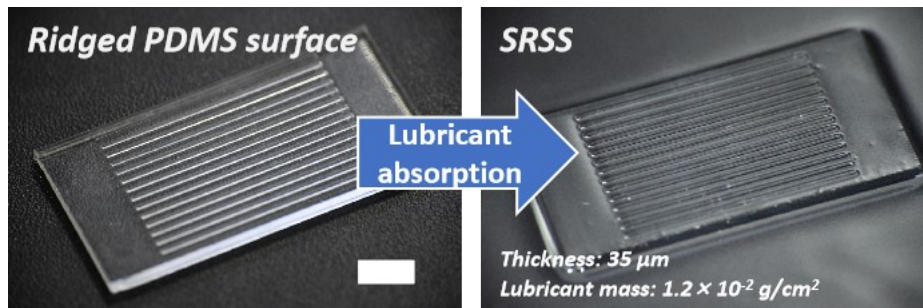
**Fig. S1.** Droplet profiles on the SRSSs with different ridge heights. The scale bars in Fig. S1 are 1 mm.



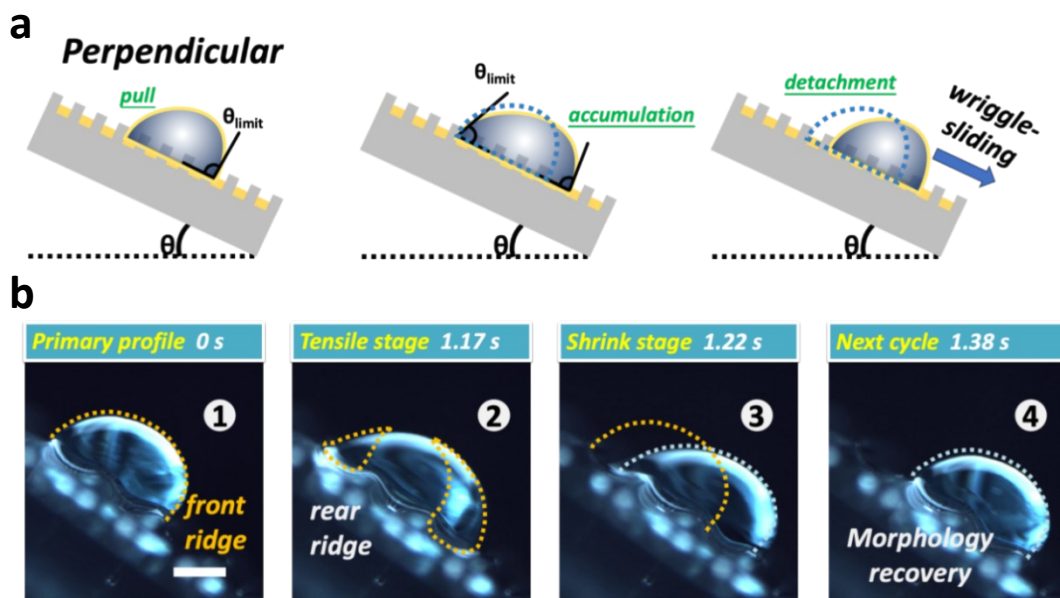
**Fig. S2.** A relatively large SRSS with side lengths of approximately 10 cm and 10 cm.



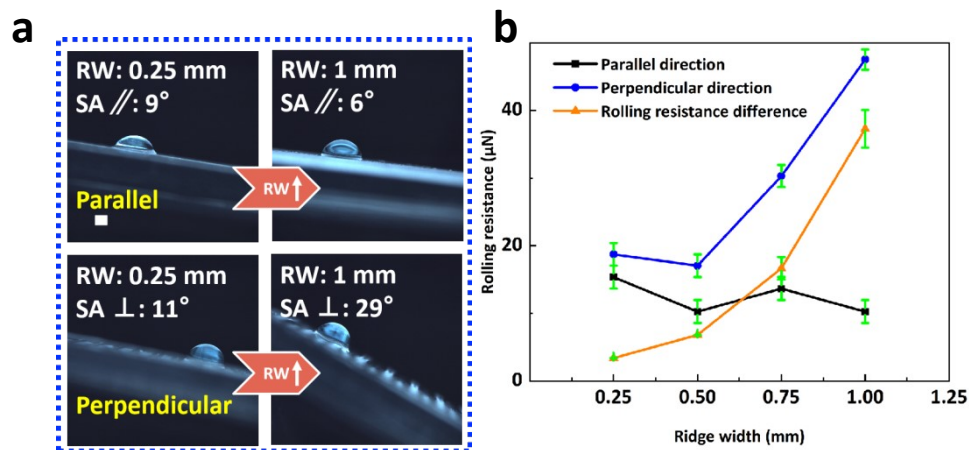
**Fig. S3.** Droplet adhesion on a flat original PDMS surface at a surface inclination of 90°.



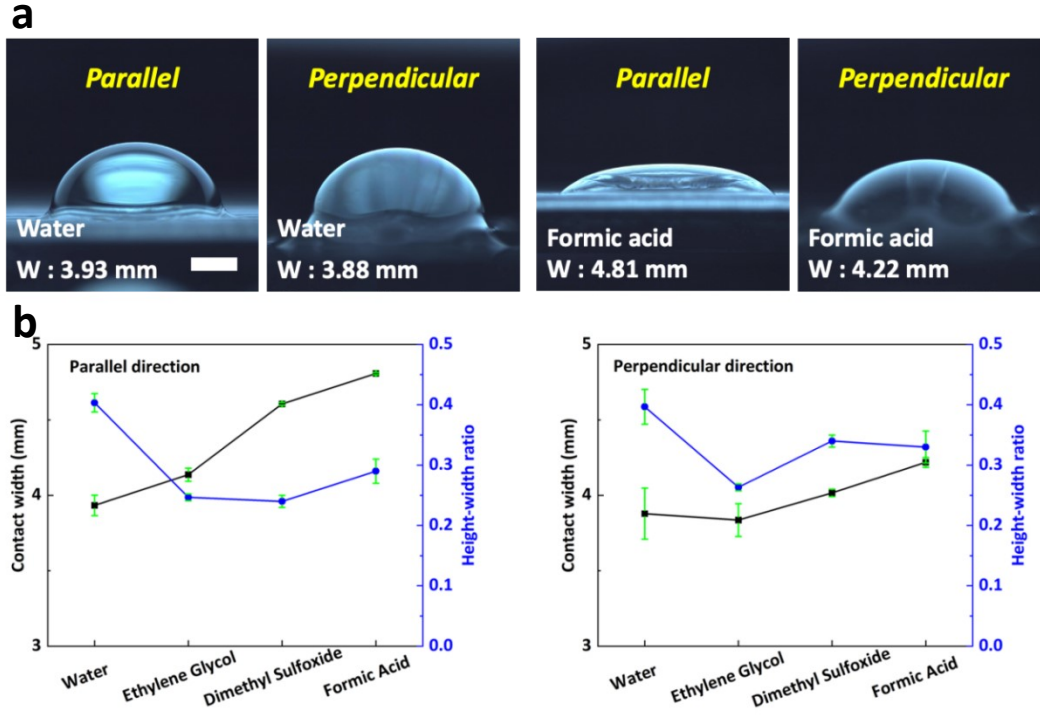
**Fig. S4.** The images of the initial ridged PDMS surface and the lubricant-infused SRSS.  
The scale bar in Fig. S4 is 1 cm.



**Fig. S5.** (a) The schematic and (b) the images of the wriggle-sliding of the droplets on the SRSSs. The scale bar in Fig. S5b is 1 mm.

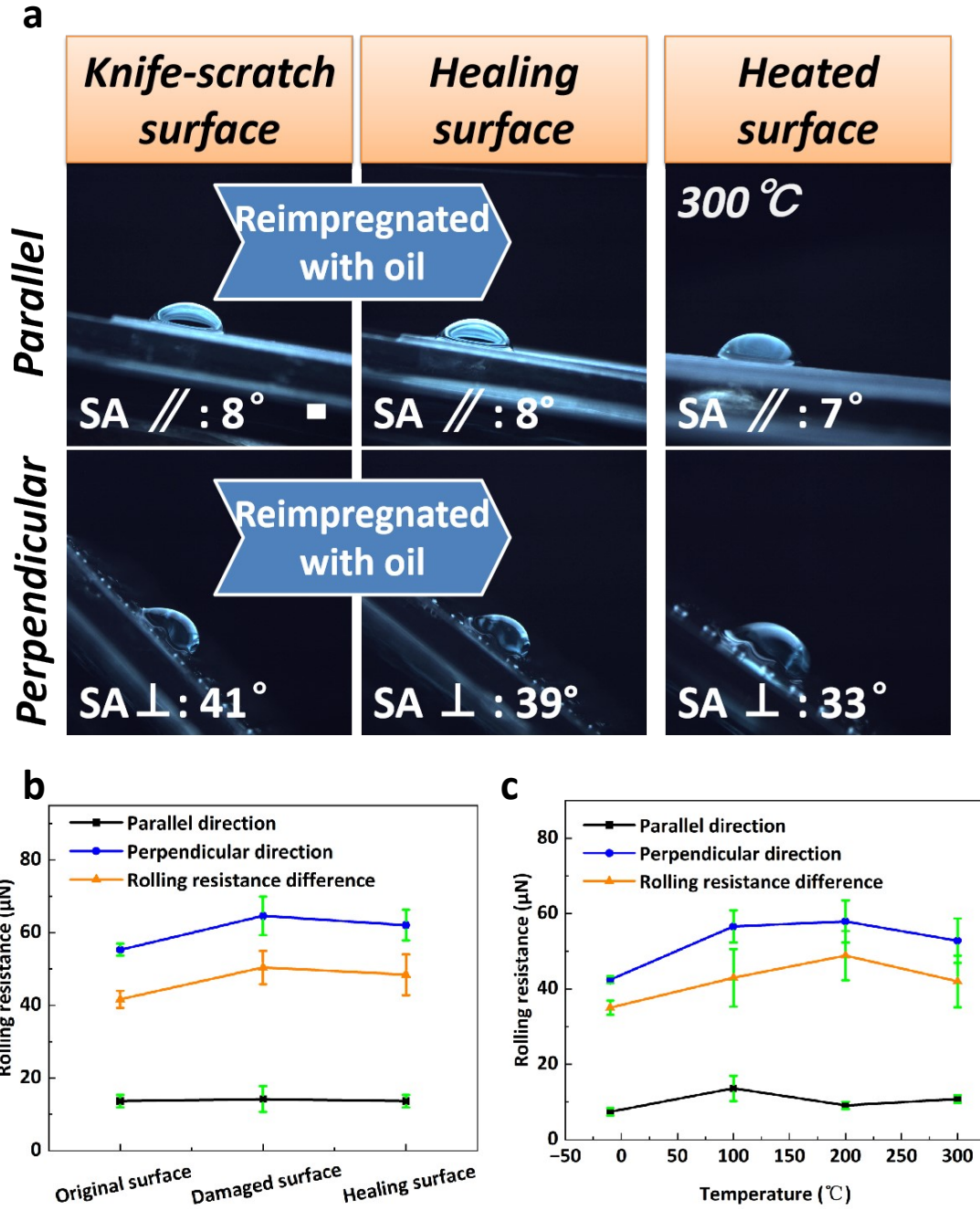


**Fig. S6.** (a) Droplet sliding processes and (b) rolling resistances on the SRSSs with different ridge widths. The scale bar in Fig. S6a is 1 mm.

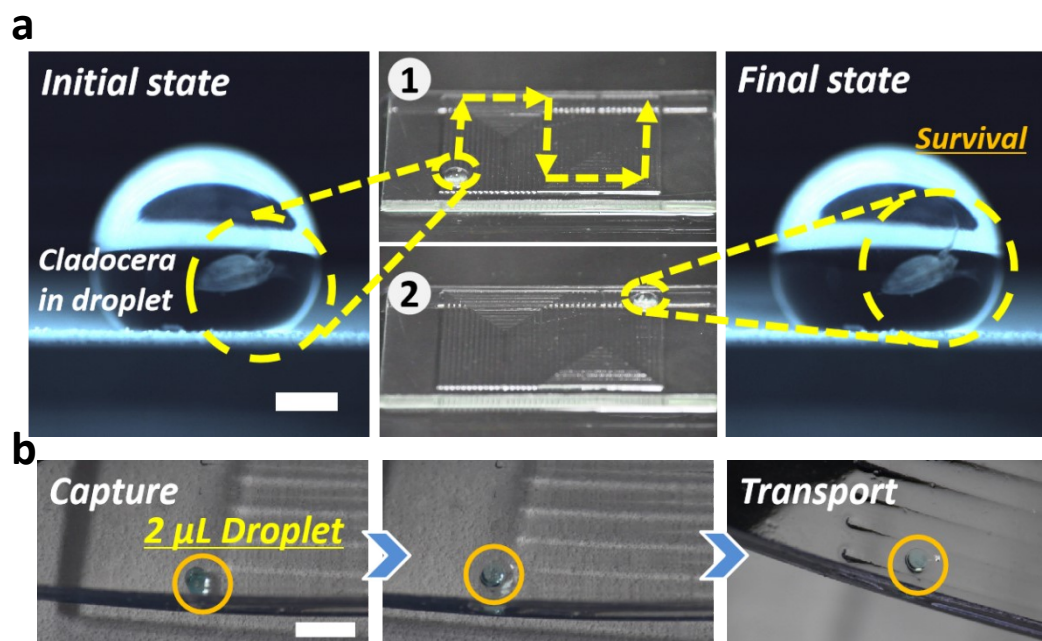


**Fig. S7.** (a) Droplet profiles, (b) contact widths, and HWRs on the SRSSs with different droplets. The scale bar in Fig. S7a is 1 mm.





**Fig. S8.** (a) Sliding of the droplet on the knife-scratched SRSS, the healing SRSS, and the SRSS after being heated at 300 °C. (b) Rolling resistances of the droplet on the knife-scratched SRSS and the healing SRSS, and (c) those of the droplet on the SRSSs after being heated or cooled at different temperatures. The scale bar in S8a is 1 mm.



**Fig. S9.** (a) Transport of the living aquatic organism on the SRSSs. (b) The grab and moving of a minimum of 2  $\mu$ L droplet through the SRSS-based mechanical arm. The scale bars in Fig. S9a and 9b are 1 mm.

**Mov. 1.** The proficient control of droplets along the ridges, switching tracks, and stable storage.

**Mov. 2.** The programmable droplet coalescence and ridge-switching motion on the SRSS with the ridge ladder configuration.

**Mov. 3.** The mechanical arm-based droplet grab and release through the SRSS.