## **Electronic Supplementary Information (ESI)**

## Double-grooved Nanofiber Surfaces with Enhanced

## **Anisotropic Hydrophobicity**

Meimei Liang,<sup>ab</sup> Xin Chen,<sup>ab</sup> Yang Xu,<sup>ab</sup> Lei Zhu,<sup>ab</sup> Xiangyu Jin<sup>ab</sup> and Chen Huang<sup>\*ab</sup>

<sup>a</sup>Key Laboratory of Textile Science & Technology, Ministry of Education, College of Textiles, Donghua University, Shanghai 201620, China
<sup>b</sup>Department of Nonwoven Materials & Engineering, College of Textiles, Donghua University, Shanghai 201620, China
Email: hc@dhu.edu.cn



**Fig. S1** Contrast fog collection experiment of as-spun fibrous surfaces with and without aluminium foil. For each group, the experiment was conducted repeatedly using at least ten samples.



**Fig. S2** a) Molecular structure of PLLA. b) EDS spectra of PLLA fibres with grooved, smooth and porous surfaces. c) FTIR spectra of PLLA fibres with grooved, smooth and porous surfaces. The peaks at 1183 and 1088 cm<sup>-1</sup> were attributed to the C–O stretching vibration, while the peaks at 1755 cm<sup>-1</sup> and 1455 cm<sup>-1</sup> were attributed to the C=O stretching vibration and CH<sub>3</sub> bending vibration, respectively. d) Wide angle X-ray diffraction patterns with grooved, smooth and porous surfaces.



Fig. S3 SEM images of a) PS fibers and b) CAB fibers electrospun from different solvent ratios. Scale bar =  $1 \mu m$ .



**Fig. S4** Cross-section SEM images of a) PS and b) CAB from different solvent ratios. Scale bar = 500 nm.



**Fig. S5** WCAs at perpendicular and parallel directions of aligned PS, CAB, PVDF and PVDF-HFP fibres with smooth and nanogrooved surfaces.



**Fig. S6** a) SEM images and diameter analyses of smooth PLLA fibres electrospun from solvent mixtures (DCM/DMF = 1/2) containing different concentration of PLLA (20%, 22%, 24%, 26% and 28%) at a constant RH of 45%. AD represents average diameter. Scale bar = 2  $\mu$ m. b) SEM images of PLLA fibres with similar AD (~900 nm) but different number of nanogrooves. Fibres are electrospun at different RHs (15%, 25%, 35%, 45%, 55%) using the same solution (15% PLLA in DCM/DMF = 2/1). Scale bar = 1  $\mu$ m. c) WCAs of PLLA fibres with different diameters and d) WCAs of PLLA fibres with different numbers of nanogrooves.



**Fig. S7** Schematic diagram of the energy barriers on single- and double-grooved surfaces at perpendicular and parallel directions. The blue arrows indicate the sliding directions.



**Fig. S8** a) Fog collection capacities of double-grooved surfaces made of PS, CAB, PVDF and PVDF-HFP fibres at parallel and perpendicular directions. b) Typical droplet state on these double-grooved surfaces.