Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Selective surface tension induced patterning on flexible textiles *via* click chemistry

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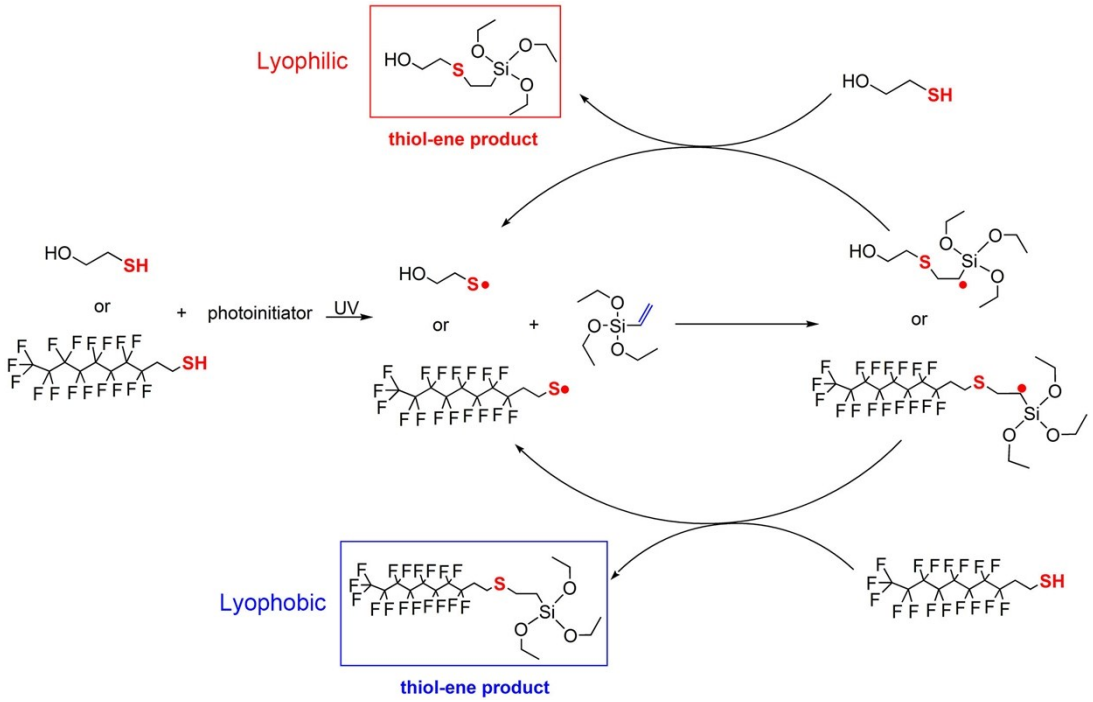


Figure S1. Schematic illustration of the reaction mechanism of the thiol-ene click chemistry in our case. The initiator produces free radical under the UV irradiation. Then the free radical takes away the H atom by attacking the -SH in thiol molecule, resulting in the free radical in thiol. The thiol radical attacks the vinyl group at the end of the silane and the active site transfer to the second C atom of the vinyl group, resulting in the silane free radical. The silane free radical attacks an another H atom of -SH in thiol molecule, resulting in the product of the thiol-ene click reaction. Besides, another thiol free radical is thus produced. The reaction is then performed into the cycle mode.

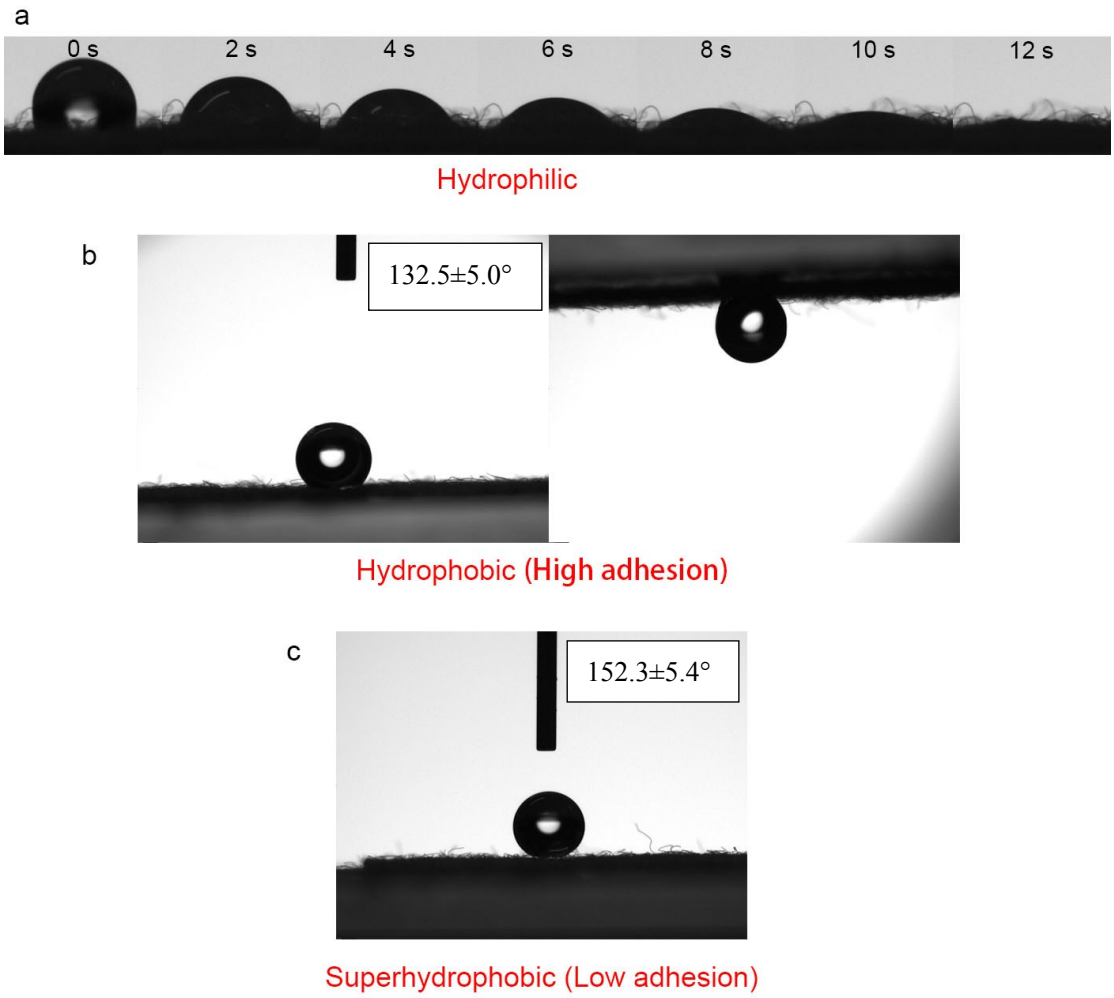


Figure S2. The water contact angles of the (a) pristine textile, (b) VTEO modified textile and (c) as-prepared textile with superoleophobic and superoleophilic pattern arrays. (a) The 5 μL water droplet spread on the pristine textile and permeated through the textile within seconds. (b) The textile after grafted with a layer of VTEO shows hydrophobic property with high adhesion. (c) The as-prepared superoleophobic and superoleophilic patterned textile shows integral superhydrophobic property.

Table S1. Surface water contact angle of various kinds of silane-modified PDMS surface. The smooth PDMS surfaces were first O-plasma treated to generate hydroxyl groups on the surfaces. Then the PDMS samples were immersed in the n-hexane solutions of various silane (10 μL) for silanization. The samples were finally washed with hexane and dried for the water contact angle measurement.

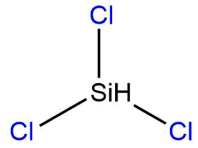
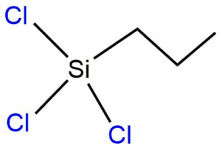
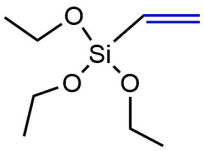
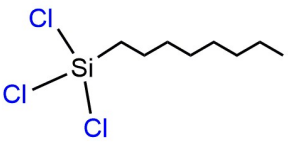
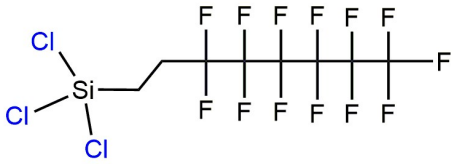
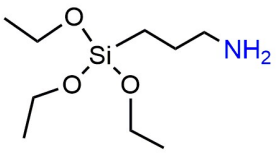
Silane	**Average water contact angle**
 Trichlorosilan	109.7°
 Trichloropropylsilane	109.8°
 Triethoxyvinylsilane	96.9°
 n-octyltrichlorosilane	104.3°
 1H,1H,2H,2H-perfluorooctyltrichlorosilane	113.1°
 3-Aminopropyltriethoxysilane	58.0°

Table S2. Surface tension of various liquids at 20°C (if not specifically pointed out). [34]

Liquid	**Surface Tension γ ($mN \cdot m^{-1}$)**
Water	72.8
Glycerol (17)	63.1
Ethylene glycol	47.7
Aniline	44.8
N-methyl-2-pyrrolidone (25)	41.0
Pyridine	38.0
N,N-Dimethylformamide	36.8
Pyrrol	36.6
Decalin	31.5
n-Decanol	30.3
Acetonitrile	28.1
Cyclohexane	27.6
Tetrahydrofuran	26.4
n-Decane	25.7
Ethanol	24.1
Methanol	24.0
Hexane	18.4

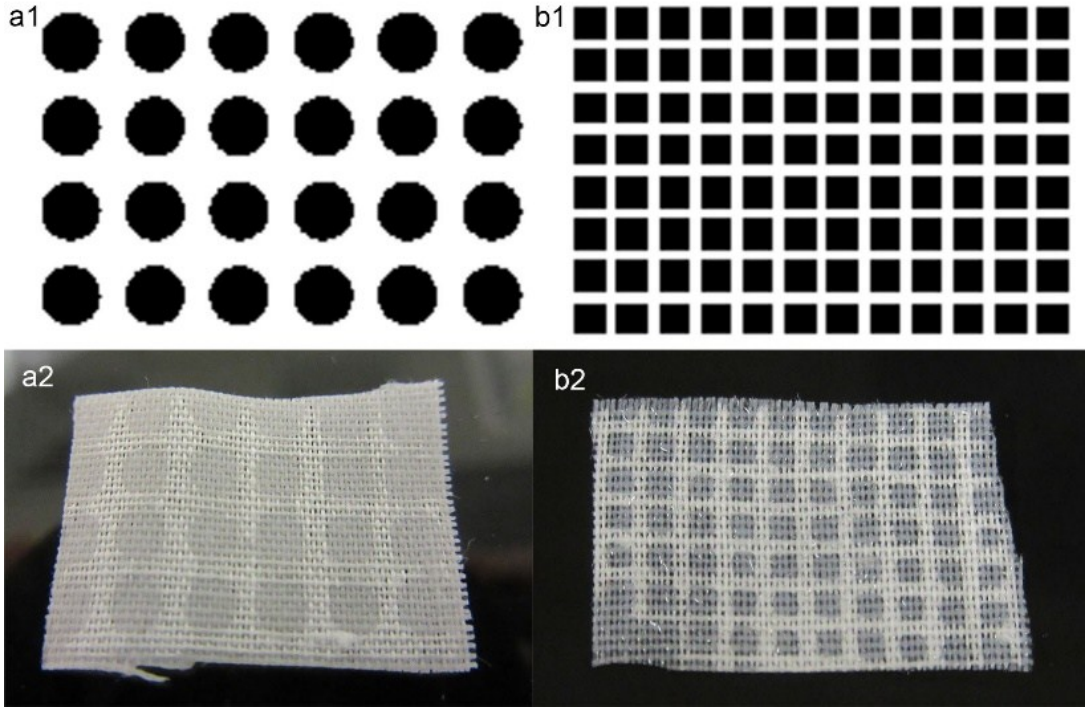


Figure S3. Photographs show the as-prepared patterned textiles with different pattern shapes and pattern sizes formed by *N*,*N*-dimethylformamide.

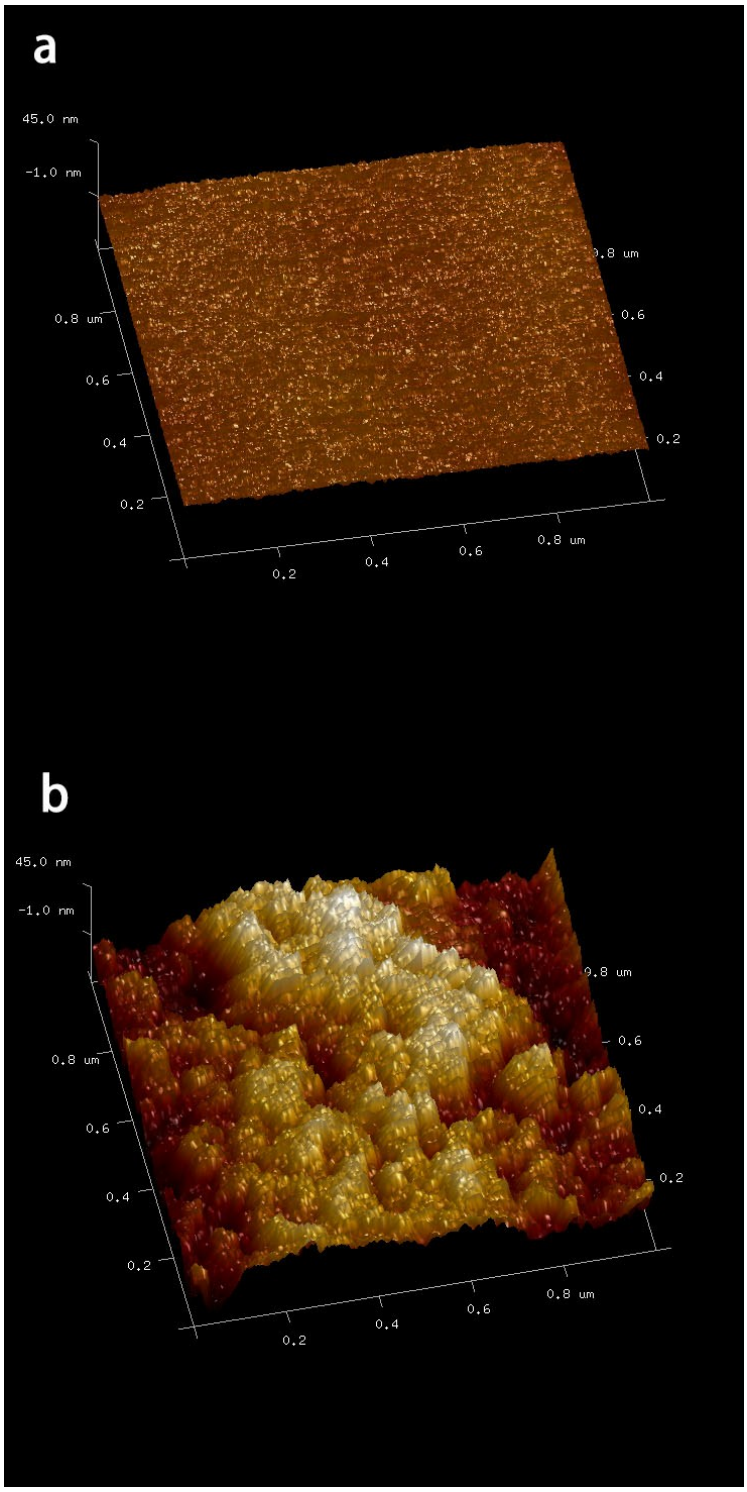


Figure S4. AFM images show three-dimensional topographies of the (a) pristine textile and (b) as-prepared textile with high-magnification.

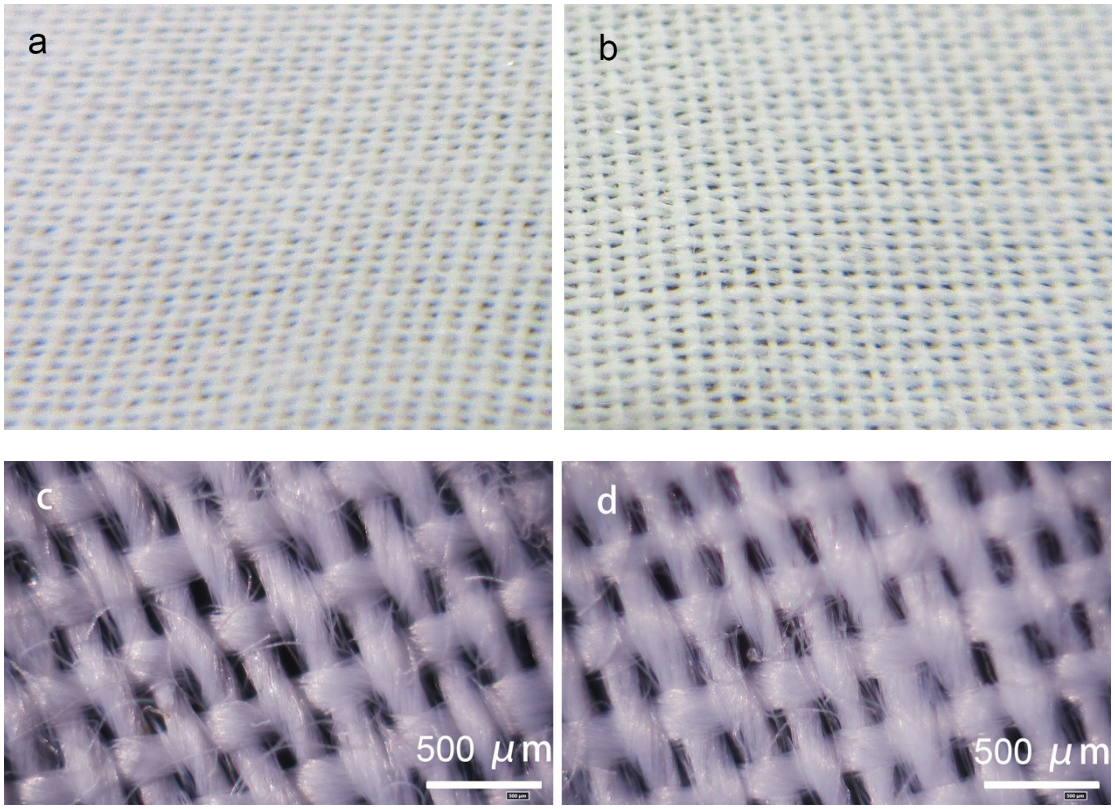


Figure S5. Optical images show the surface appearance of the pristine textile (a) and the as-prepared textile (b) after the superoleophobic and superoleophilic patterning process. Optical microscope images show the surface appearance of the oleophobic region (c) and the oleophilic region (b) on as-prepared textiles.

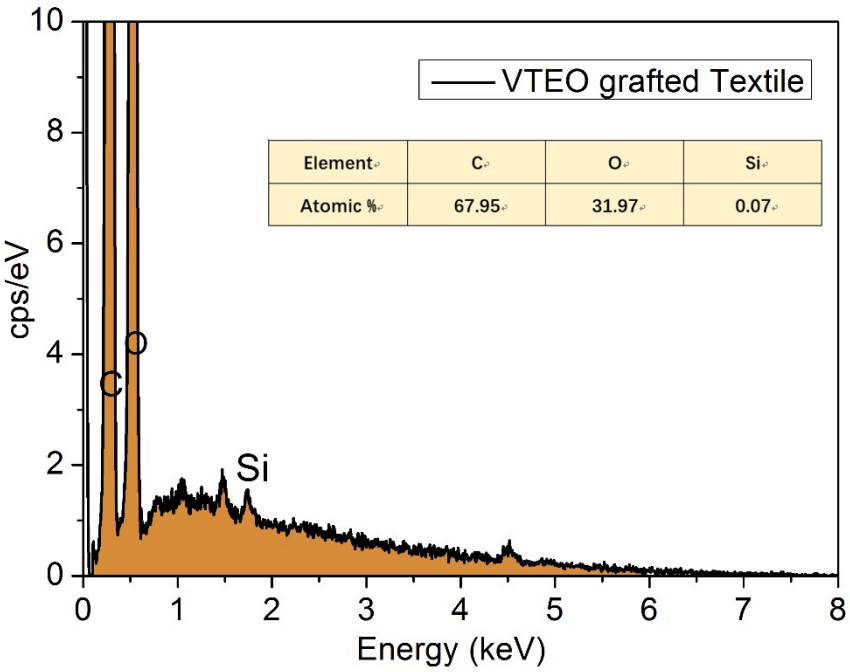


Figure S6. EDS spectrum shows the element composition of the VTEO grafted textile.

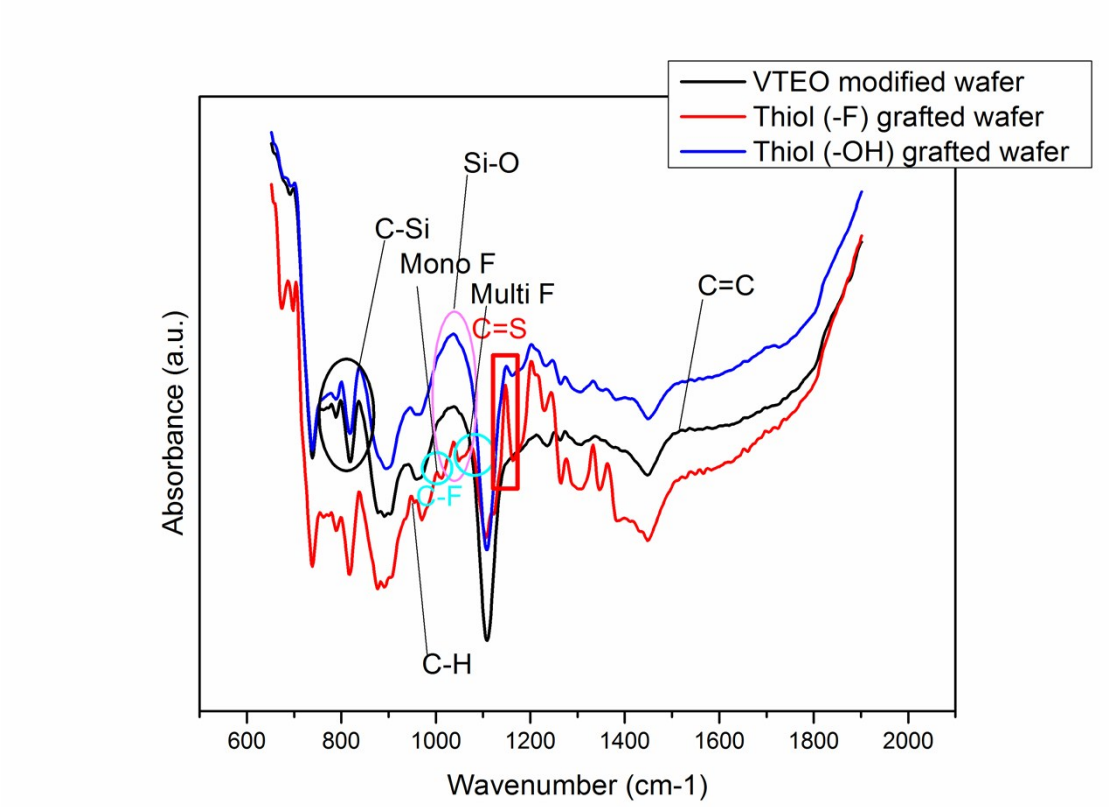


Figure S7. ATR-FTIR spectra of functional monolayers on the Si wafer. The raw Si wafer was treated with piranha solution (H_2SO_4/H_2O_2 = 3/1, v/v) for 30 min, rinsed with deionized water and dried with N_2 flow. The as-cleaned Si wafer was served as background to conduct the ATR-FTIR of the following samples. The black curve shows the spectrum of the VTEO modified Si wafer. The red curve shows the spectrum of the 1*H*, 1*H*, 2*H*, 2*H*-perfluorodecanethiol grafted Si wafer by thiol-ene chemistry on VTEO modified Si wafer. The blue curve shows the spectrum of the 2-mercaptoethanol grafted Si wafer by thiol-ene chemistry on VTEO modified Si wafer.

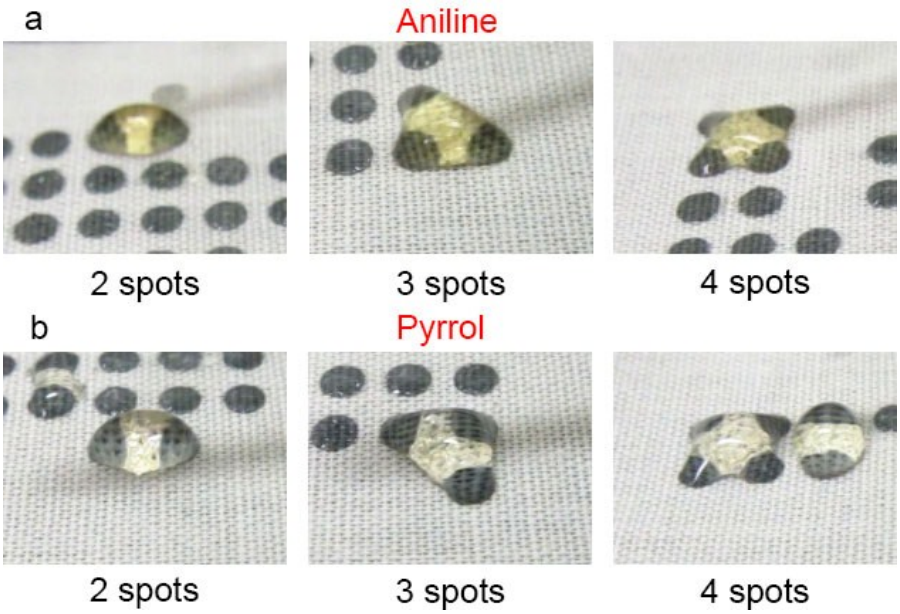


Figure S8. (a) Optical images show the instantaneous wetting modes as soon as an aniline droplet contact the as-prepared textile. (b) Optical images show the instantaneous wetting modes as soon as a pyrrol droplet contact the as-prepared textile.

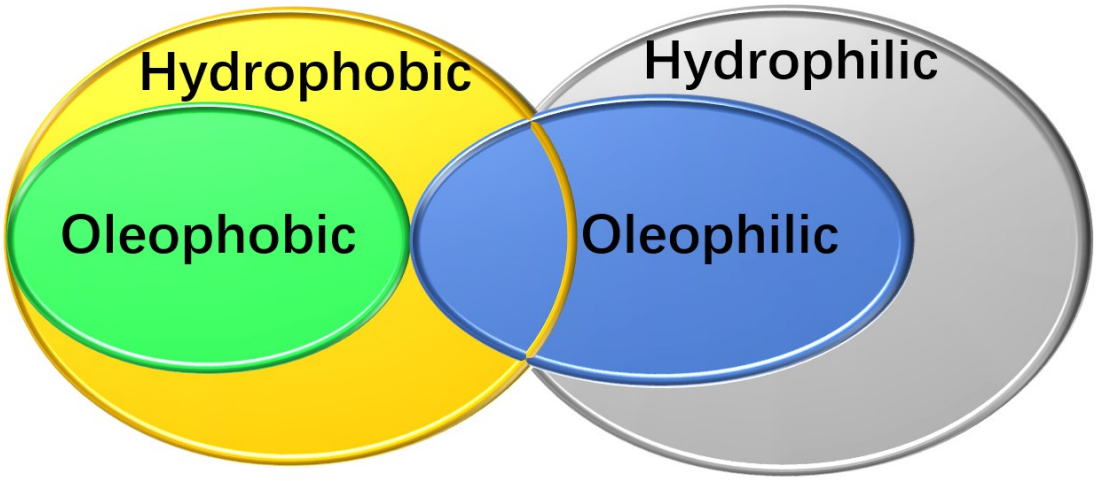


Figure S9. Diagram shows the relationship between the hydrophobic, hydrophilic, oleophobic and oleophilic wetting states in air.

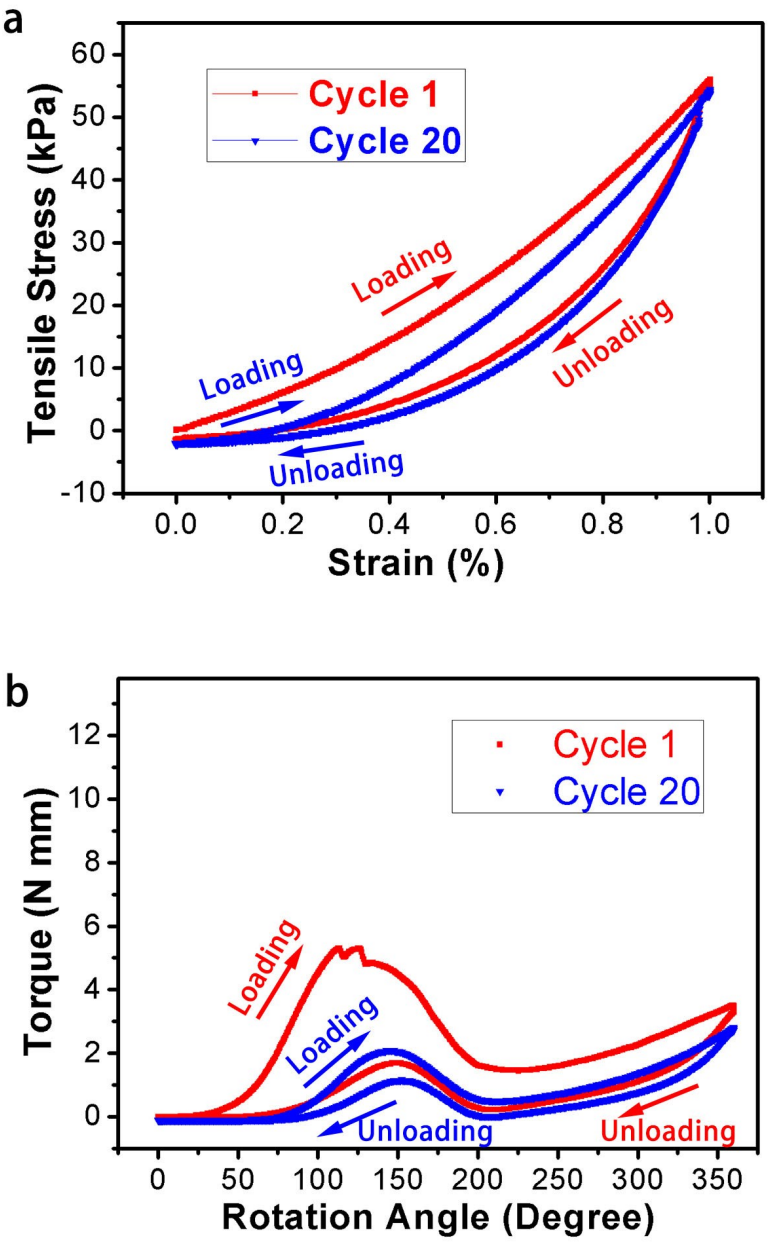


Figure S10. (a) Tensile stress–strain curves of the pristine textile at the 1st cycle and the 20th cycle. (b) Torque–angle curves of the pristine textile at the 1st cycle and the 20th cycle.

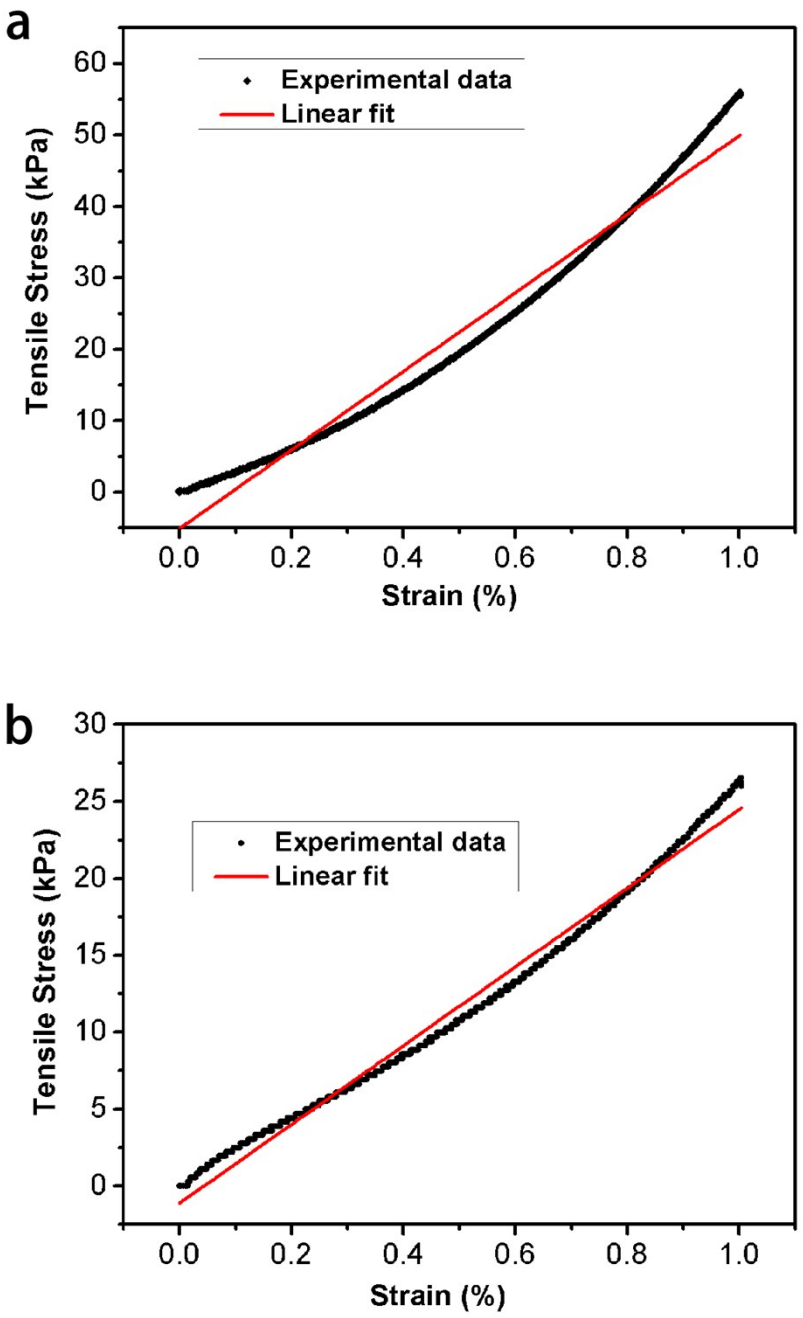


Figure S11. The linear fitting curves of the tensile test of (a) the original textile and (b) the as-prepared textile. The experimental data used for the linear fitting is the tensile process in the 1st cycle. The slopes in (a) and (b) are 55.0 kPa and 25.6 kPa, respectively.