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Simple one-pot approach toward robust and boiling-water resistant superhydrophobic cotton fabric and the application in oil/water separation

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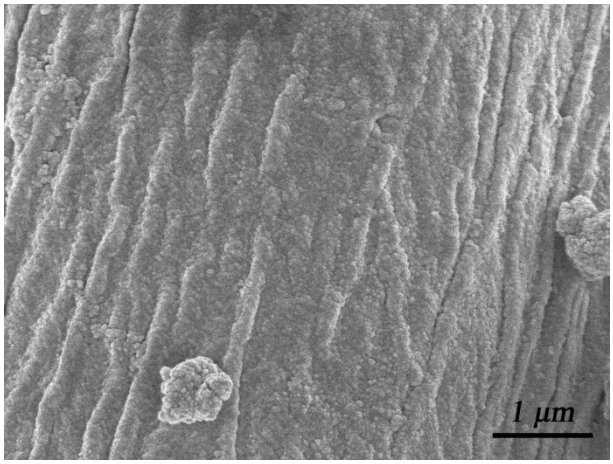

Fig. S1 FESEM image of the treated cotton before the addition of DA.

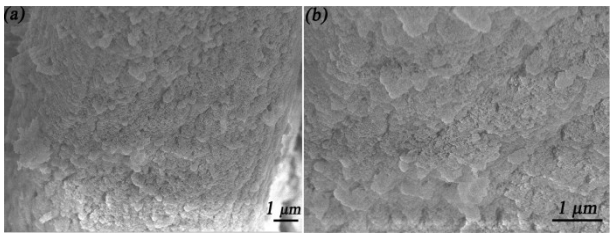

Fig. S2 (a) Low resolution FESEM image of superhydrophobic PDA@SiO_2 coated cotton fabric. (b) High resolution FESEM image of superhydrophobic PDA@SiO_2 coated cotton fabric.

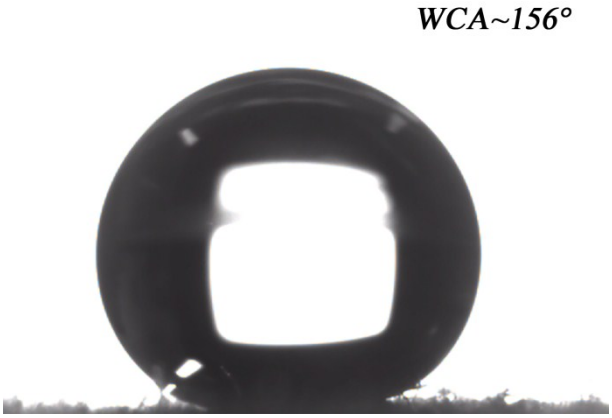

Fig. S3 Water droplet contact angle photograph of the superhydrophobic PDA@SiO_2 coated cotton fabric.

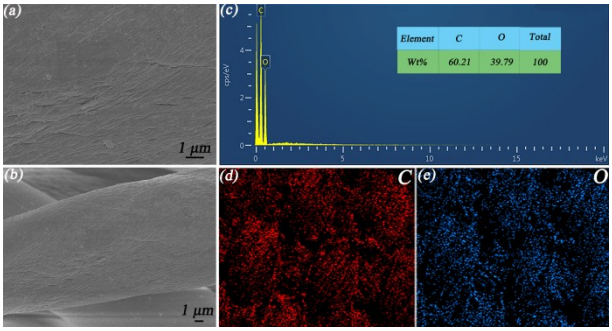

Fig. S4 (a and b) High and low resolution FESEM images of the pristine cotton fabric, respectively. (c) EDS analysis of the pristine cotton fabric. (d and e) SEM-EDS elemental mapping of C, O of the pristine cotton fabric, respectively.

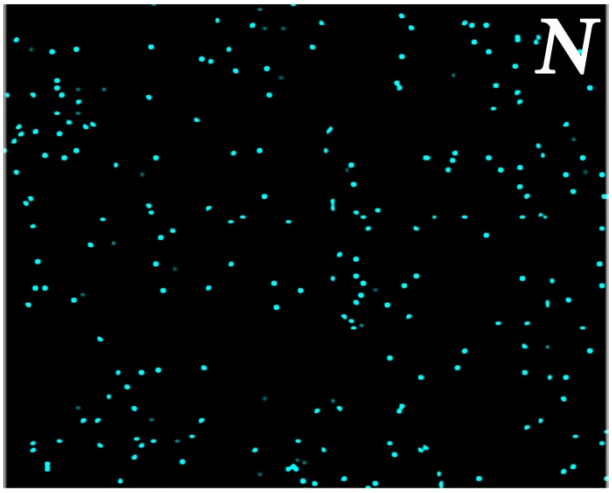

Fig. S5 N element is scattered in the SEM-EDS elemental mapping of superhydrophobic PDA@SiO_2 coated cotton fabric.

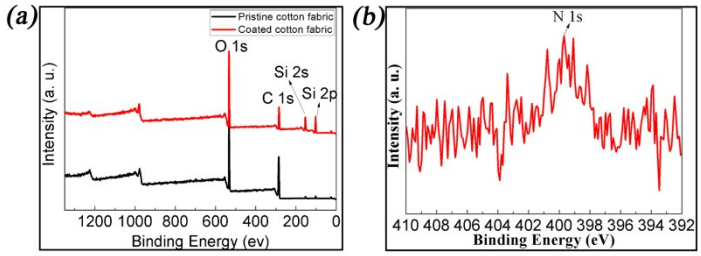

Fig. S6 (a) The four main peaks at 529 eV, 284.8 eV, 103.12 eV, 153.5 eV and 101 eV are respectively labeled as O 1s, C 1s, Si 2s and Si 2p in the spectra of PDA@SiO_2 nanocoating. (b) The weak peak at 400 eV in N1s spectra of PDA@SiO_2 nanocoating, further indicated the existence of PDA.

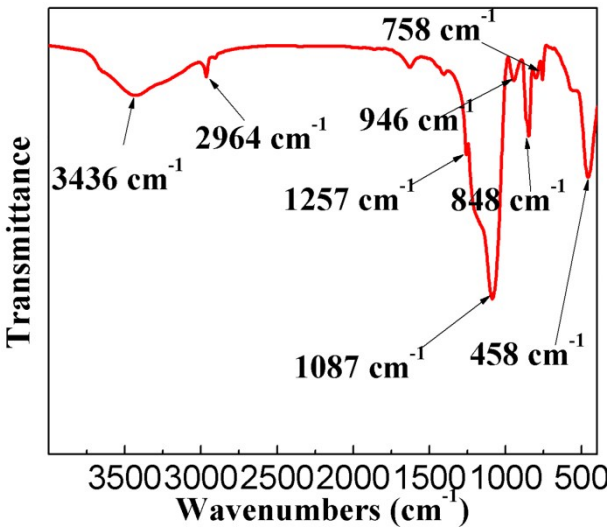

Fig. S7 FTIR spectra of the superhydrophobic PDA@SiO_2 powder.

Si-$(CH_3)_3$ related at 2964 cm^{-1} (C-H), 1257 cm^{-1} (Si-C) and 758 cm^{-1} (C-H). The band at 1087 cm^{-1}, 848 cm^{-1} and 458 cm^{-1} are related to the Si-O-Si. Peak related at 1257cm^{-1} that can be assigned to C=C resonance vibrations in the aromatic rings of PDA. The strong absorption band at 3436 cm^{-1} assigned to -OH stretching vibrations is likely to remaining water.

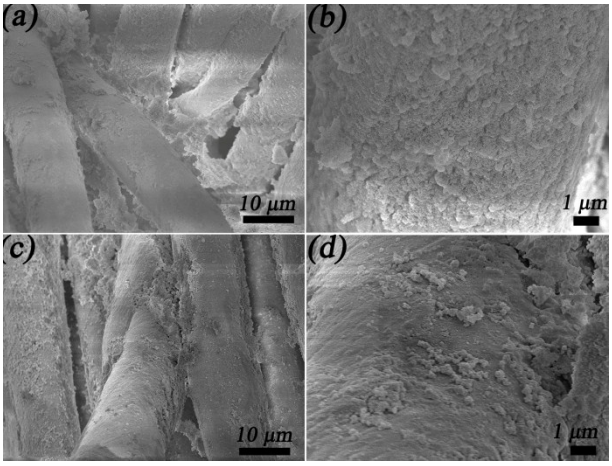

Fig. S8 The low and high resolution FESEM image of (a, b) superhydrophobic fabric before abrasion treatment, respectively. (c, d) superhydrophobic fabric treated by ultrasonic treatment in ethanol for 60 min, respectively.

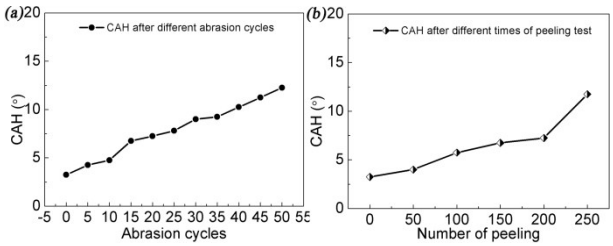

Fig. S9 (a) CAH value of superhydrophobic fabric after each abrasion cycle. (b) CAH value of superhydrophobic fabric after each tear test cycle.

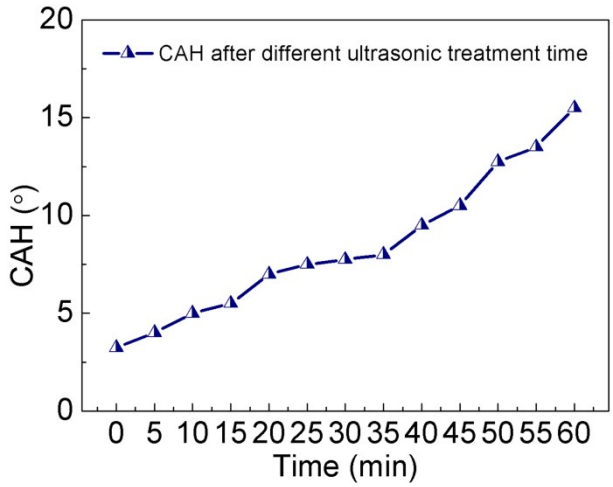

Fig. S10 CAH value of superhydrophobic fabric after each 5 min ultrasonic treatment.

Fig. S11 The photograph of water droplets (dyed with crystal violet) placed on the superhydrophobic PDA@SiO_2 coated cotton fabric experimented a 60 min ultrasonic treatment in n-hexane.

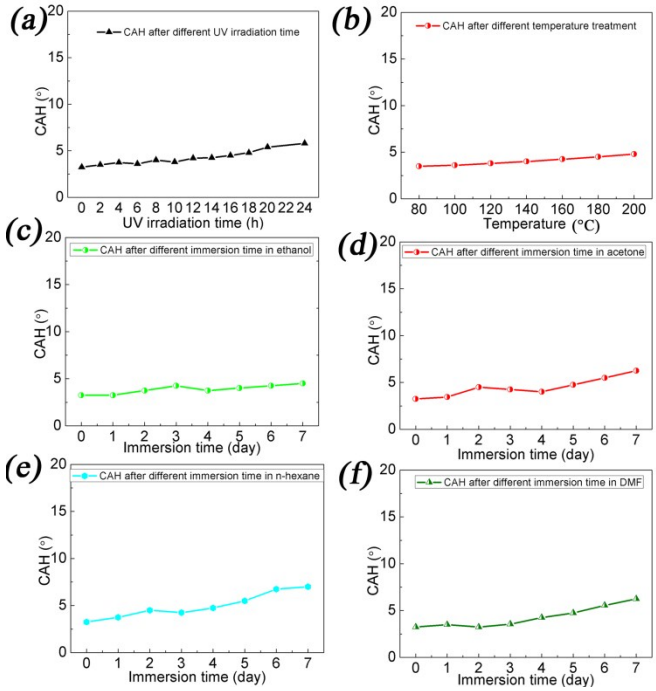

Fig. S12 CAHs change of the superhydrophobic PDA@SiO_2 coated cotton fabrics after (a) strong UV irradiation for diverse periods of time from 0-24 h, (b) heating treatment under different temperatures for 2 h, and (c) immersion in ethanol for different periods of time, (d) immersion in acetone for different periods of time, (e) immersion in n-hexane for different periods of time, (f) immersion in DMF for different periods of time.

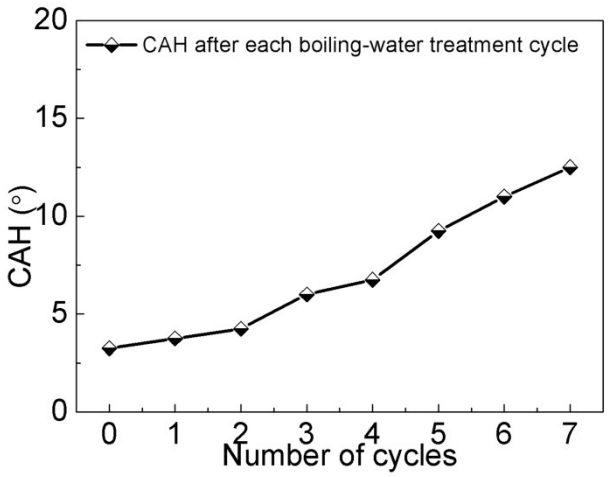

Fig. S13 CAH of the tested fabric after each 5 min boiling-water treatment.

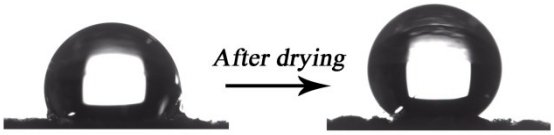

Fig. S14 Wetted fabric caused by boiling water treatment obtain high hydrophobicity after dried in the oven with 120° for 10 min.

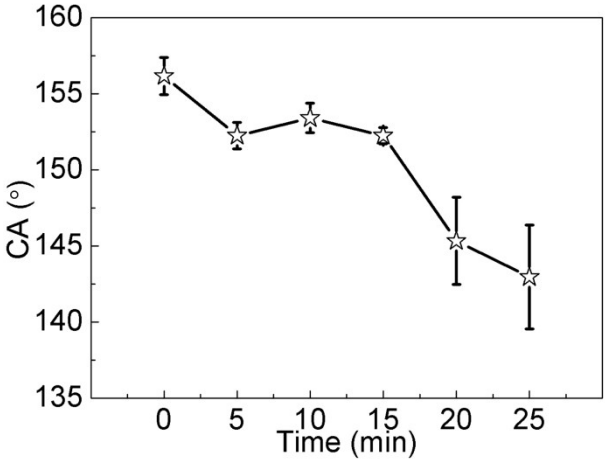

Fig. S15 CAs of the superhydrophobic PDA@SiO_2 coated cotton after treatment in the boiling water for periods of time.

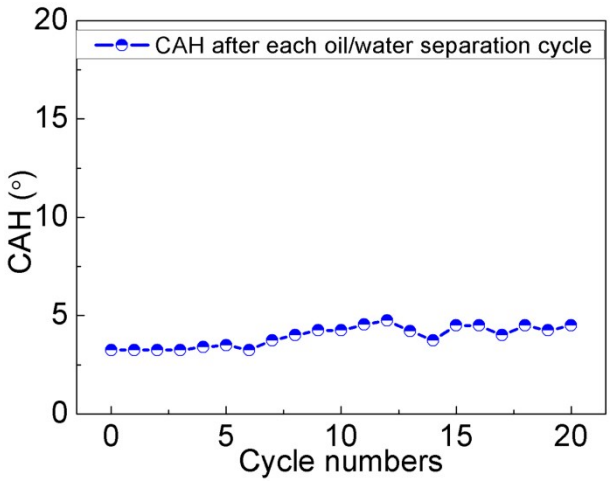

Fig. S16 CAH of superhydrophobic fabric after each separation cycle and been washed by ethanol and dried.