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Supplemental Information

A "PDMS-in-Water" Emulsion Enables Mechanochemical Robust Superhydrophobic Surface with Self-healing Superhydrophobic Nature

Mingzheng Ge[a], Chunyan Cao[b], Fanghua Liang[a], Rong Liu[a], Yu Zhang[a], Wei Zhang[a]*, Tianxue Zhu[c], Bo Yi[b], Yuxin Tang[d]*, Yuekun Lai[c]*

[a]School of Textile & Clothing, National & Local Joint Engineering Research Center of Technical Fiber Composites for Safety and Health, Nantong University, Nantong 226019, P. R. China

[b]Department of Biomedical Sciences, City University of Hong Kong, Hong Kong 999077, P. R. China

[c]National Engineering Research Center of Chemical Fertilizer Catalyst (NERC-CFC), College of Chemical Engineering, Fuzhou University, Fuzhou 350116, China

[d]Institute of Applied Physics and Materials Engineering, University of Macau, Macau 999078, P. R. China

Corresponding author email: zhangwei@ntu.edu.cn; yklai@fzu.edu.cn; yxtang@um.edu.mo.

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Table S1. Physical properties of pristine cotton fabric, PDMS@cotton fabric fabricated in PDMS-in-Water emulsion and PDMS-in-THF solution, respectively.

1. Experimental Section

Materials and reagents: Cotton fabric was bought from Shanghai Textile Industry. THF, hexadecane, dichloromethane, trichloromethane and toluene were purchased from Sigma-Aldrich and used without further purification. PDMS pre-polymer (Sylgard 184A) was from Dow Corning Corporation.

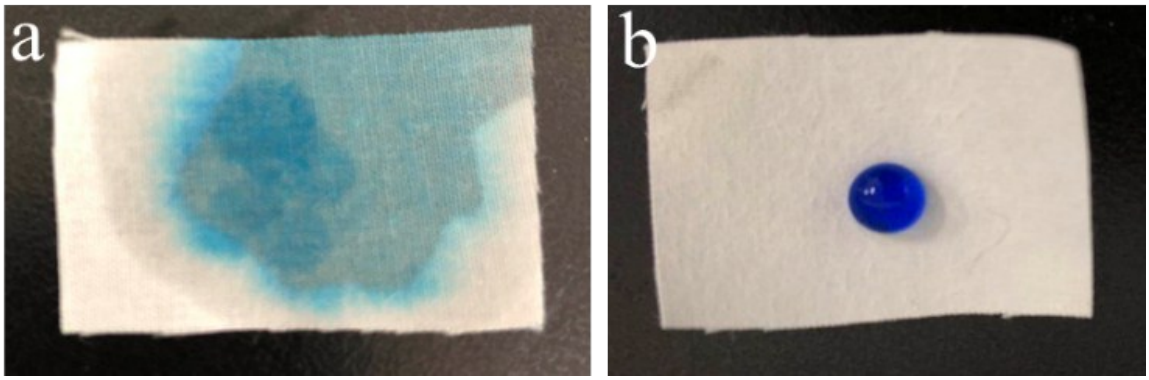
Preparation of dip-coating solution: PDMS was dissolved in THF, hexadecane, dichloromethane and toluene separately, and then stirred for 20 min to obtain homogeneous solutions. Besides, in order to dissolve PDMS in water, PDMS was pretreated by plasma treatment in air. And then PDMS-in-Water emulsion can be obtained by simply dispersing PDMS in water with different ratio of PDMS, followed by ultrasonication at 30-40 °C for 30 min.

Synthesis of superhydrophobic PDMS@cotton fabric: The cotton fabric was firstly ultrasonicated in toluene and ethanol solution to remove the plant wax layer, exposing large quantities of hydroxyl groups on outer surface of the fiber. Then, cotton fabric was dipped into the as-prepared PDMS-in-Water emulsion for 3 min and subsequently dried at 80 °C for 1 h in an electrical oven.

Characterizations of superhydrophobic PDMS@cotton fabrics: The size and distribution of PDMS in water were measured by a particle sizer (90Plus Zeta). The microstructures of PDMS@cotton fabric were characterized using a field emission scanning electron microscope (FESEM, ZEISS G300) at 5.0 kV. An energy dispersive X-ray spectrometer (EDS) fitted to the FESEM was used for elemental analysis. X-ray photoelectron spectroscopy (XPS, KRATOS, Axis Ultra HAS) was employed to analyze the chemical composition of the superhydrophobic PDMS@cotton fabric. Fourier transform infrared (FTIR) spectroscopy was performed with a Nicolet 5700 instrument. The optical photographs were captured by the optical microscope (LEICA DM2500P). The wetting properties of the treated cotton fabric were measured using a Krüss DSA 100 (Krüss Company, Germany) apparatus. The volume of droplets used for static contact angle measurements was 6 μL. In addition, tensile strength and elongation at break were tested by electronic fabric strength machine (INSTRON-3365). Air permeability was investigated by using a digital

air permeability measuring instrument (YG461E-11). The washing durability of PDMS@cotton fabric was examined by accelerated laundering durability test according to the AACC 61-2006 standard method under conditions of 2A. As for an abrasion test, the superhydrophobic PDMS@cotton fabric was subjected to 3.5 kPa with pristine cotton fabric serving as an abrasion surface and the tested sample was dragged in one direction with a speed of 3 cm s^{-1}.

2. Supporting Figures



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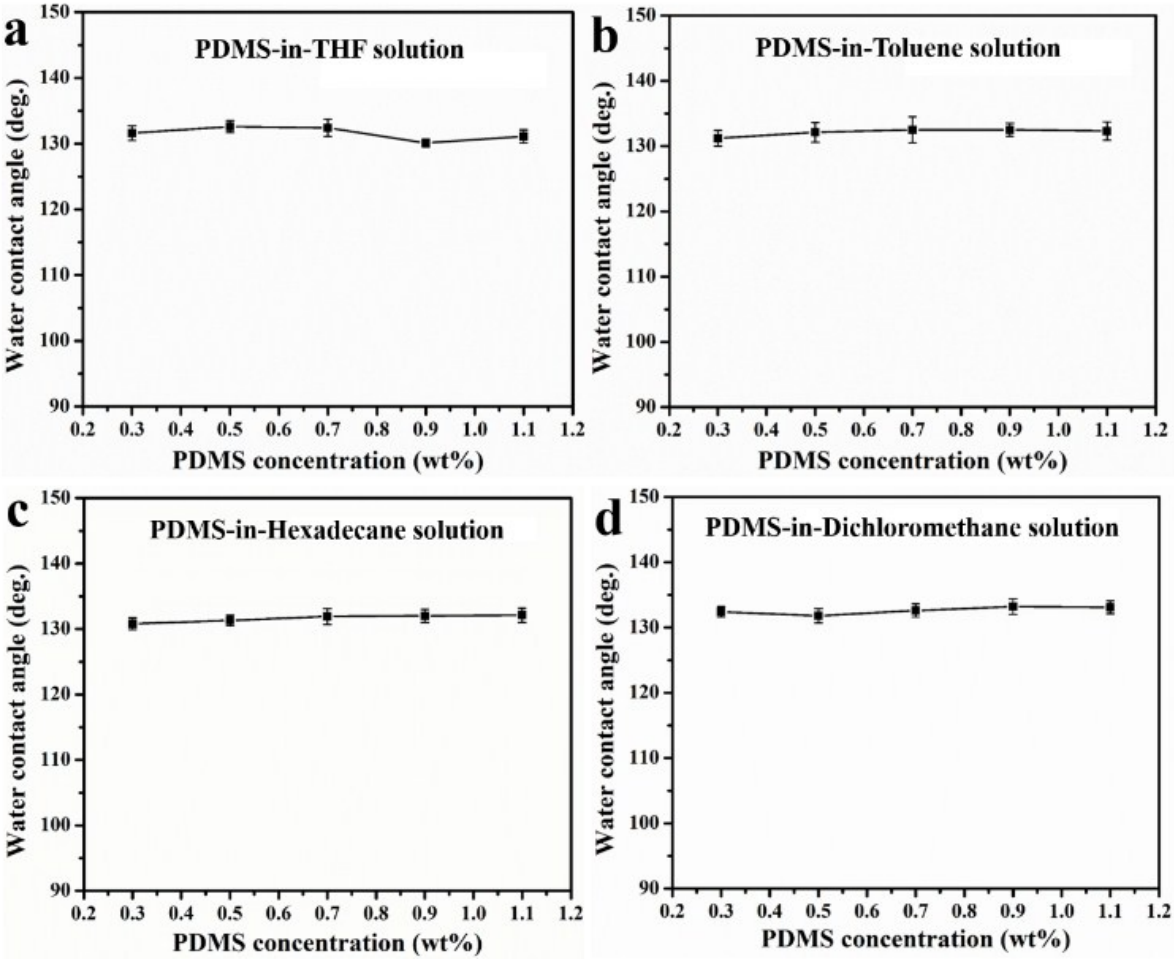

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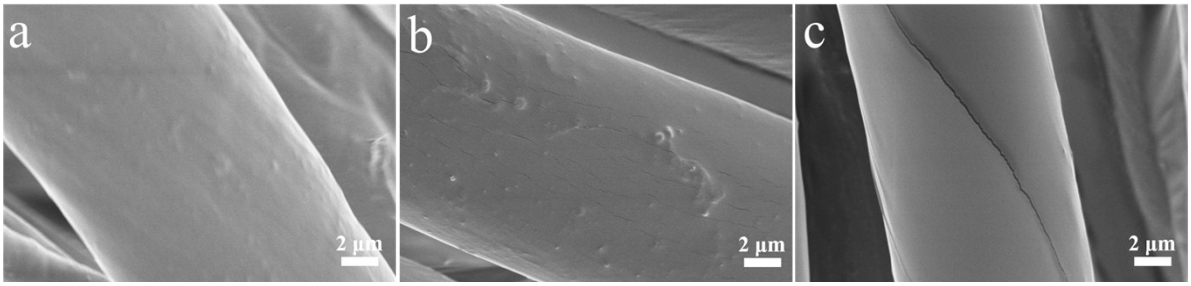

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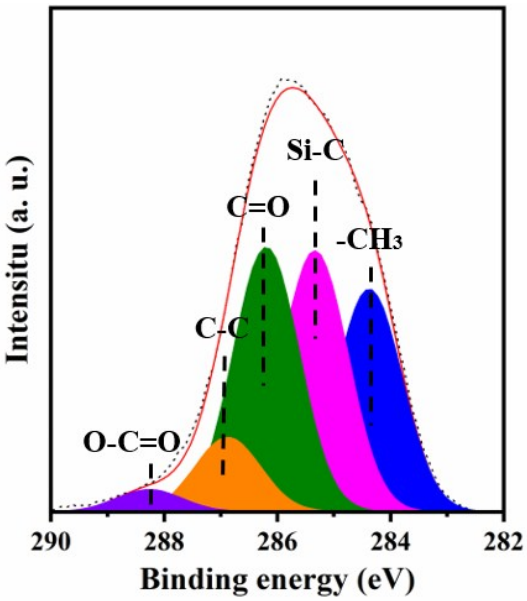

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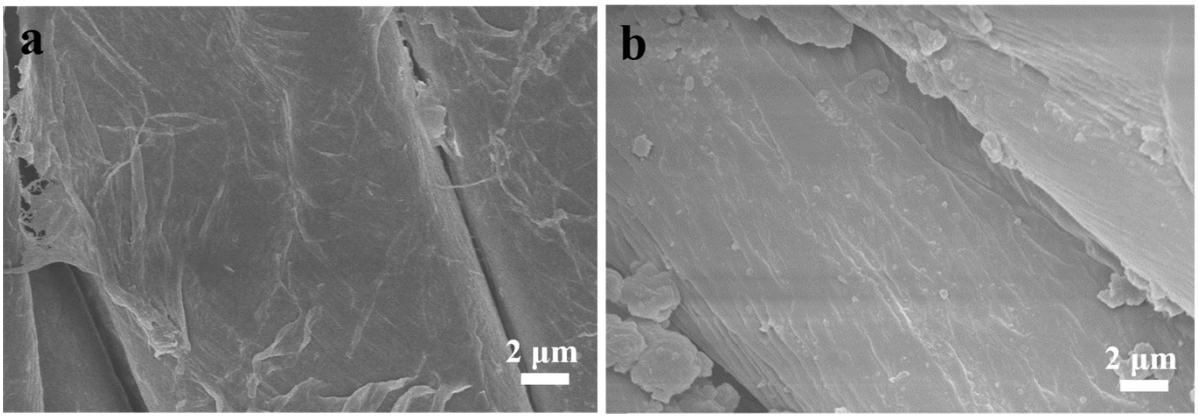

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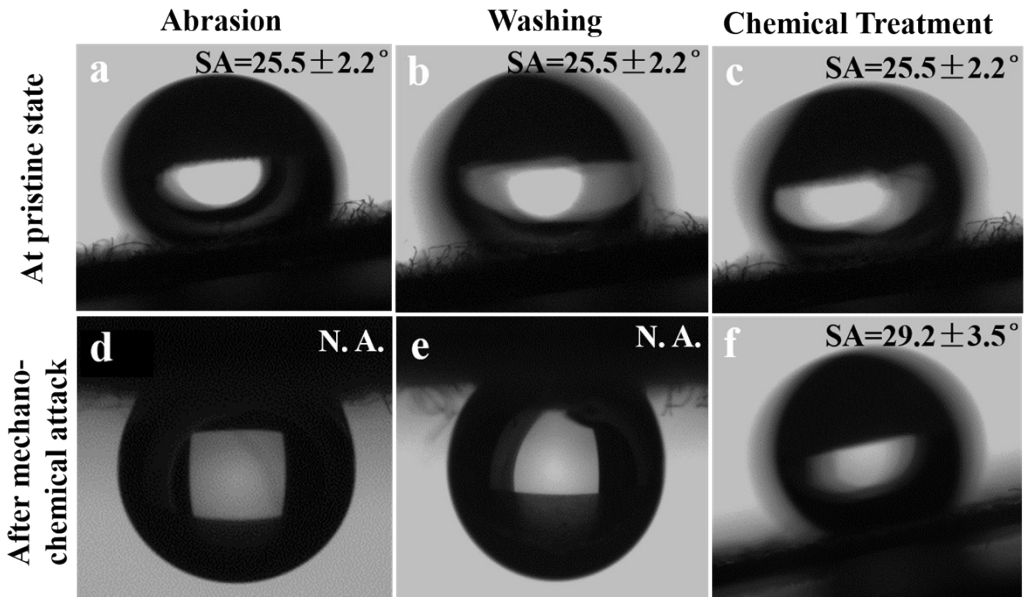

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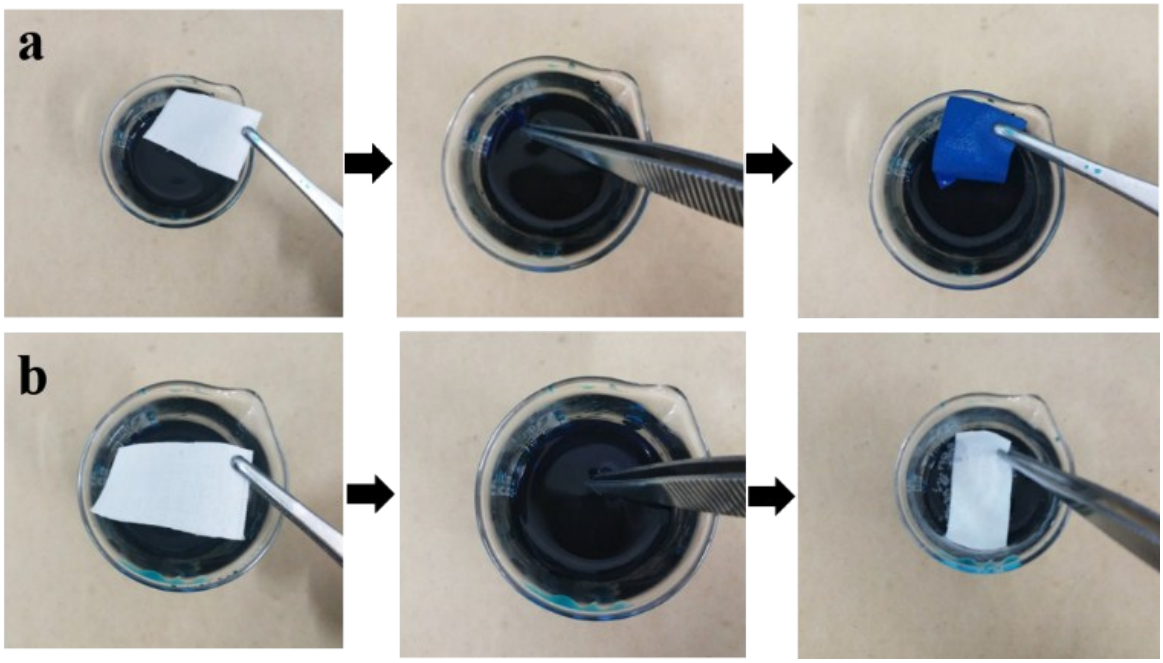

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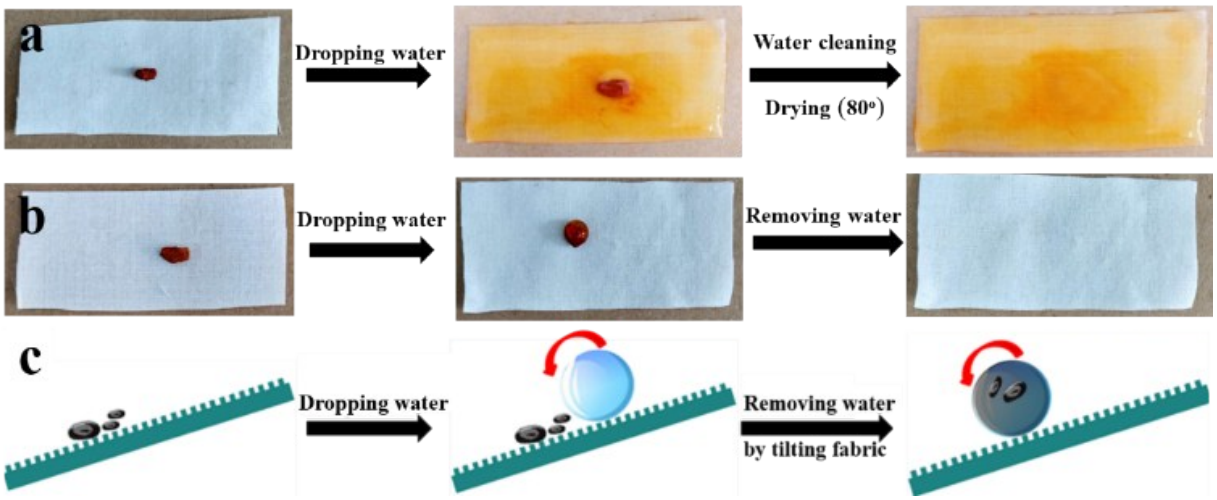

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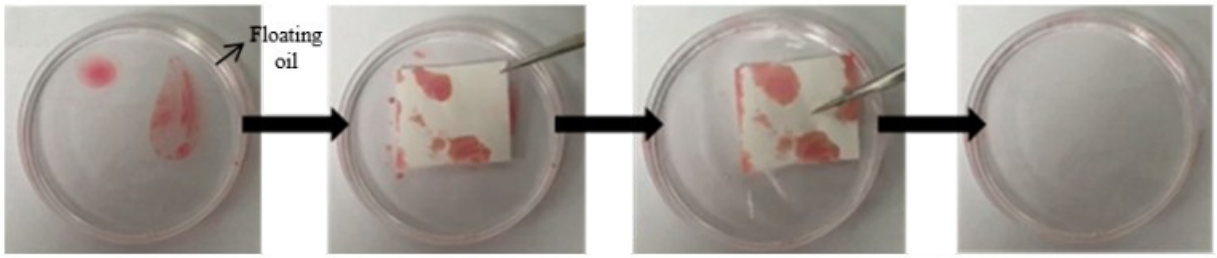

Figure S9. Absorption processes of light oil on the water surface by PDMS@cotton fabric. Toluene was used as light oil.

Table S1. Physical properties of pristine cotton fabric, PDMS@cotton fabric fabricated in PDMS-in-Water emulsion and PDMS-in-THF solution.

Property	Tensile strength ($N\ cm^{-1}$)		Elongation at break (%)		Air permeability ($mm\ s^{-1}$)
	Warp	Weft	Warp	Weft	
Pristine	194±5	261±6	20.1±1.2	6.9±1.8	1740±25
PDMS-in-THF solution	55±12	126±9	20.8±1.0	8.3±0.8	816±18
PDMS-in-Water emulsion	210±7	275±8	21.5±0.9	9.5±0.6	1443±21