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A non-fluorine method for preparing multifunctional robust superhydrophobic coating with applications in photocatalysis, flame-retardance, and oil-water separation

Bo Wang, Shan Peng*, Yingchun Wang, Xinxin Li, Kunmeng Zhang, Caiyun Liu

College of Chemistry and Environmental Science, Hebei University, Baoding 071002, Hebei, China

Corresponding author. E-mail: pengshan5213@163.com Phone: (+86)15013038214

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Fig. S1: Mechanism illustration for grafting reaction between PDMS and TiO_2 particle using UV illumination treatment.

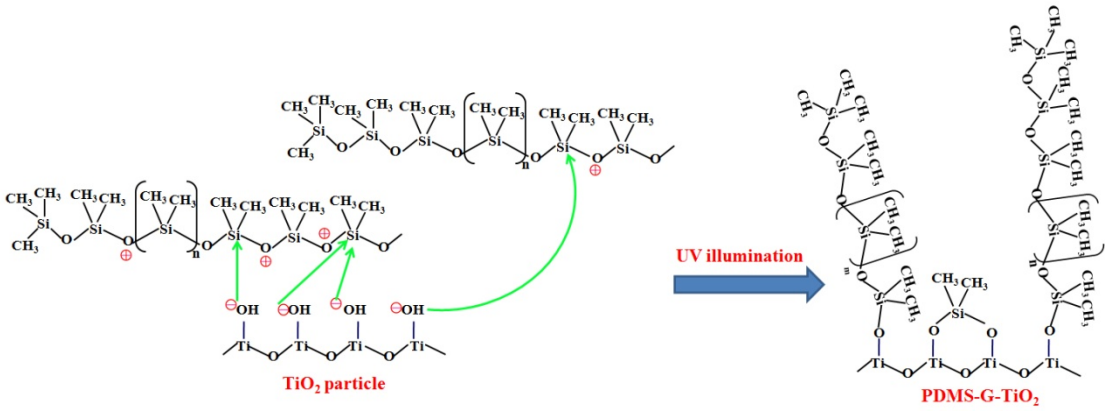


Fig. S2: Mechanism illustration for grafting reaction between PDMS and MH particle using heating treatment.

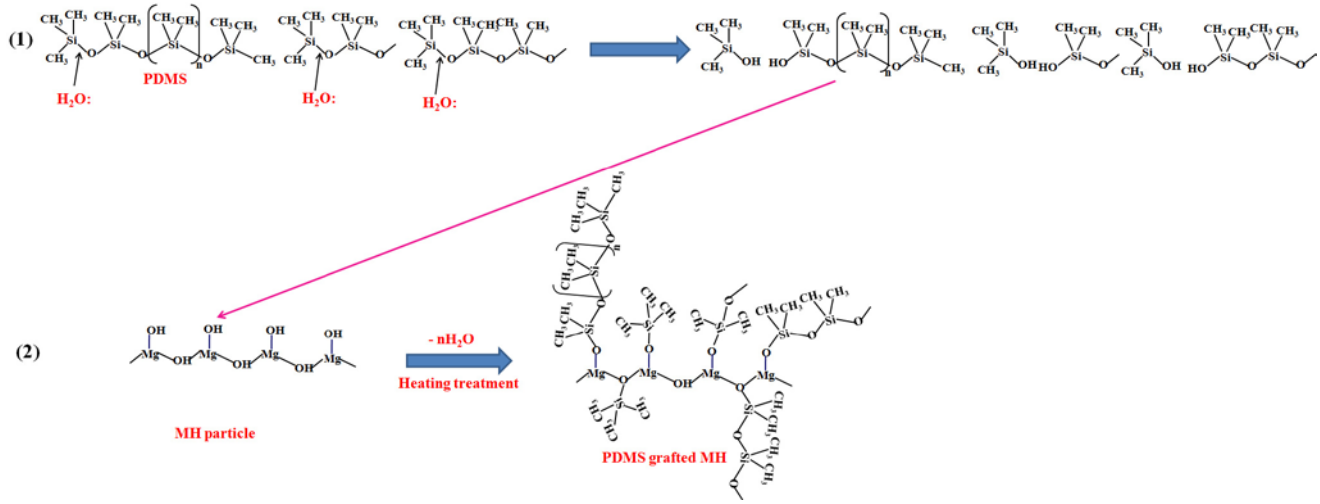


Fig. S3: EDS image and EDS mapping images for PDMS-TiO_2 powder. Elements of C, Ti, O, and Si were detected.

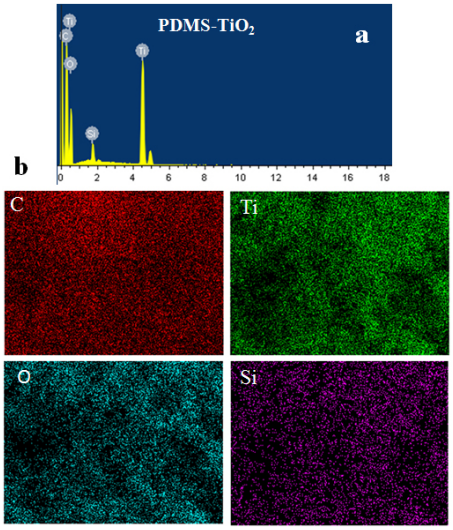


Fig. S4: (a, b) Photographs for dispersions of MH and PDMS-MH powders in various polar and non-polar solvents. The MH powder could only disperse in water before the grafted reaction. However, the PDMS-MH powder could disperse into various non-polar solvents after grafted with PDMS. (c, d) Photographs for dispersions of TiO_2 and PDMS-TiO_2 powder in various polar and non-polar solvents. The TiO_2 powder could only disperse in water before the grafted reaction. However, the PDMS-TiO_2 powder could disperse into various non-polar solvents after grafted with PDMS.

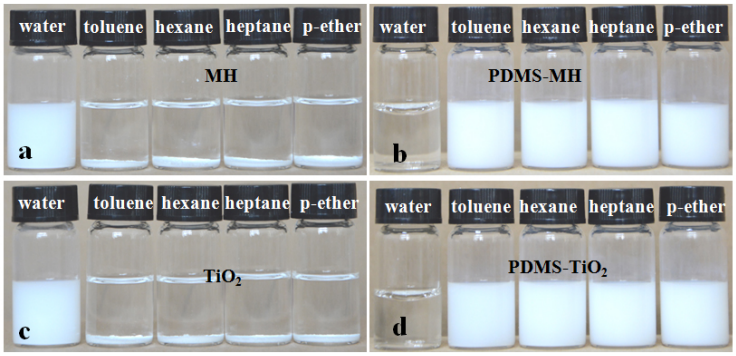


Fig. S5 Infiltration process of water drops on the original PET fabric. Water droplets quickly impregnated through the fabric, and became 0° finally.

Fig. S6 Lower-magnification SEM image for coated fabric.

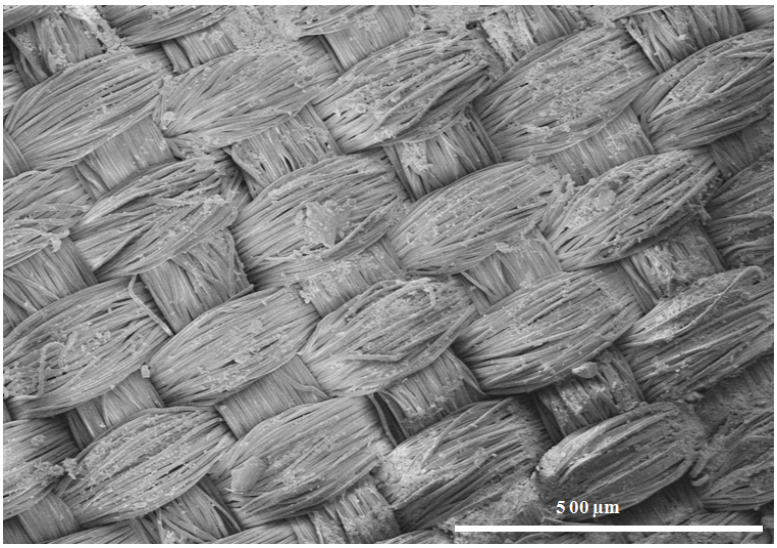


Fig. S7 Variations of water contact angles of coated fabric towards various UV irradiation time as long as 80 h. The surface showed superior stable superhydrophobicity even UV-irradiated for as long as 80 h.

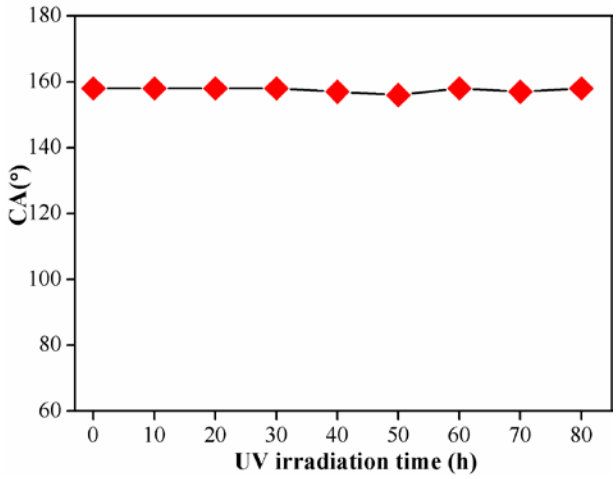


Fig. S8 (a_1-a_3) The coated cotton quickly adsorbed the floated dodecane (dyed by sudan in red) from water, and left clean water. (b_1-b_3) The coated cotton degraded the contaminated dodecane under UV illumination, and the cotton surface turn clean, however, the superhydrophobicity was still be maintained.

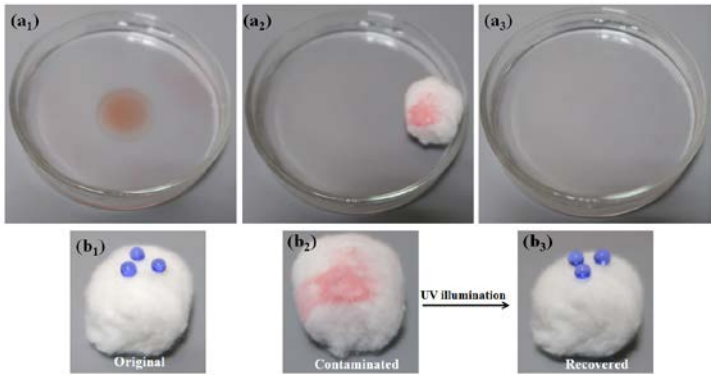


Fig. S9 Vertical flame tests for pure PDMS-TiO_2@epoxy coated fabric (a_1-a_4), and pure PDMS-MH@epoxy coated fabric (b_1-b_4), respectively.

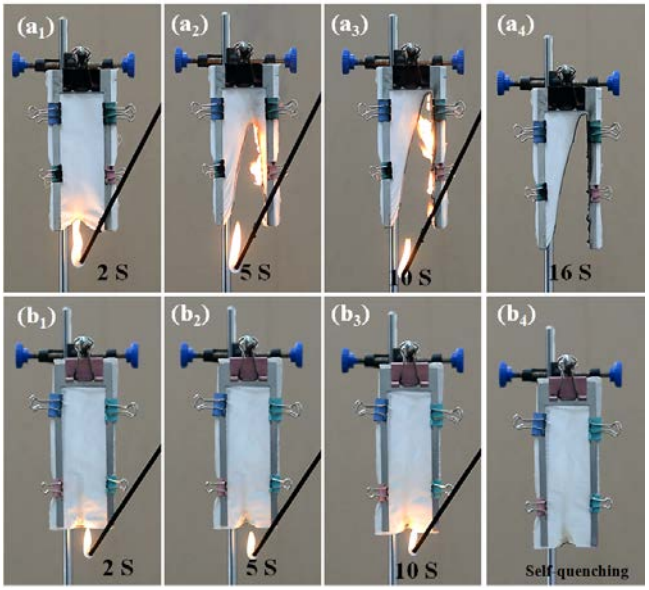
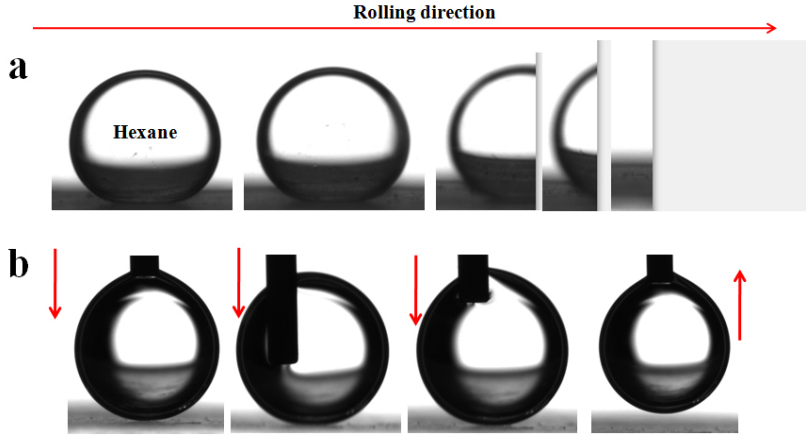


Fig. S10 (a) A rolling process for water drop under hexane environment. The underoil WSA in hexane was achieved as low as 0°. (b) the surface showed very low adhesion with water drop when positioned under dodecane. The water drop could not drop down even when forcibly compressed treatment.



Video S1 recorded the combustion behavior of pure fabric.

Video S2 recorded the combustion behavior of coated fabric used coating with mass ratio of PDMS-MH and PDMS-TiO_2 of 5:1.

Video S3 recorded the combustion behavior of coated fabric used coating with mass ratio of PDMS-MH and PDMS-TiO_2 of 10:1.

Video S4 recorded the separation process of water-chloroform mixtures.

Video S5 recorded the separation process of NaOH solution-chloroform mixtures.

Video S6 recorded the separation process of HCl solution-chloroform mixtures.

Video S7 recorded the separation process of hot water-chloroform mixtures.