Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Simple Spray Deposition of the Water-based Superhydrophobic Coatings with High Stability for Flexible Applications

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Supplementary results:

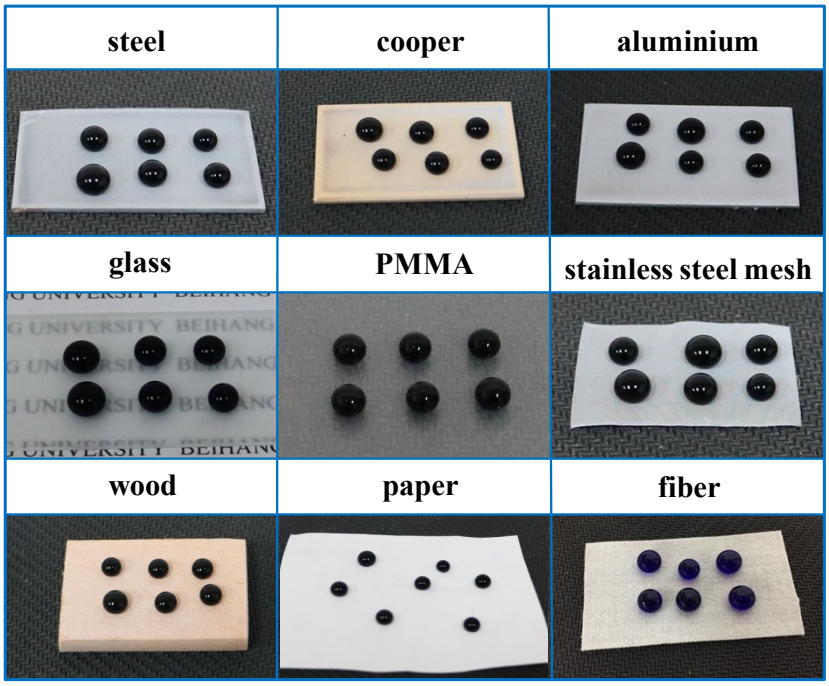


Figure S1. Water droplets placed on the composite superhydrophobic surfaces of various substrates.

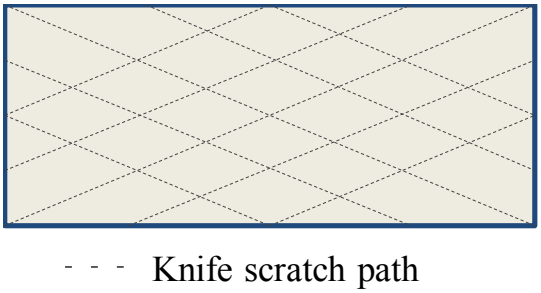


Figure S2. Schematic of knife-scratch setup

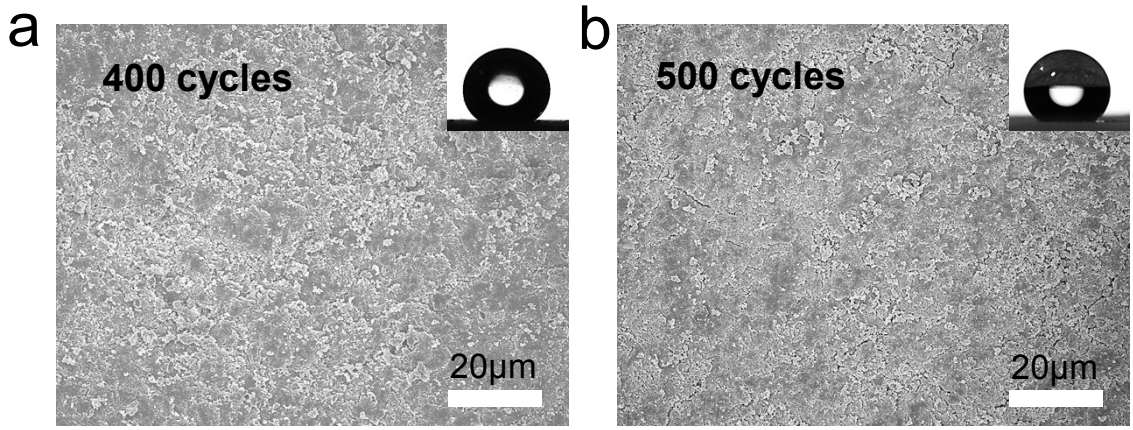


Figure S3. SEM images of the composite coatings after (a) 400 cycles of abrasion, (b) 500 cycles of abrasion. The inset is the water contact angle of the coating.

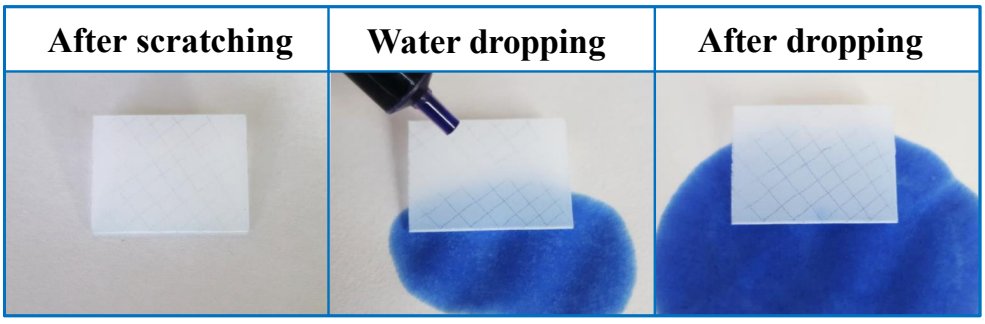


Figure S4. The composite superhydrophobic coating retained its water-repellent property even after knife scratches

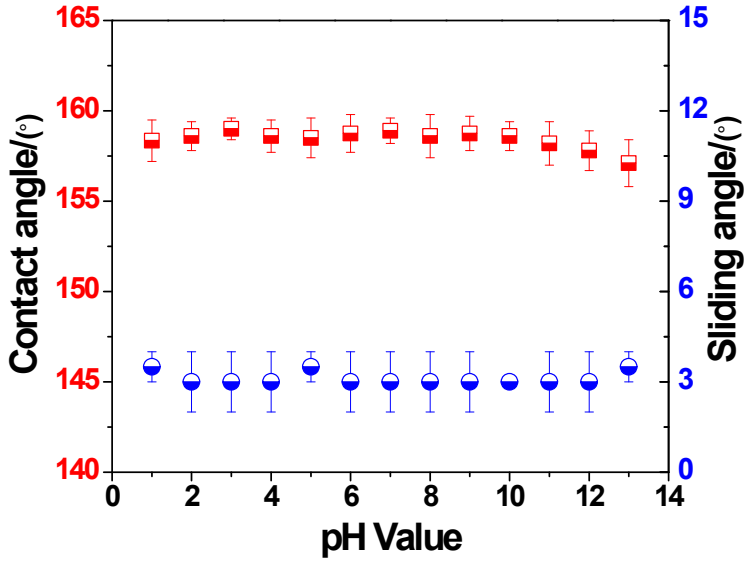


Figure S5. Water contact angles and sliding angles of the as-prepared superhydrophobic coating with different pH of aqueous solution immersion tests. The composite coatings still remain superhydrophobicity after immersion tests for 24h, demonstrated excellent pH-tolerant property.

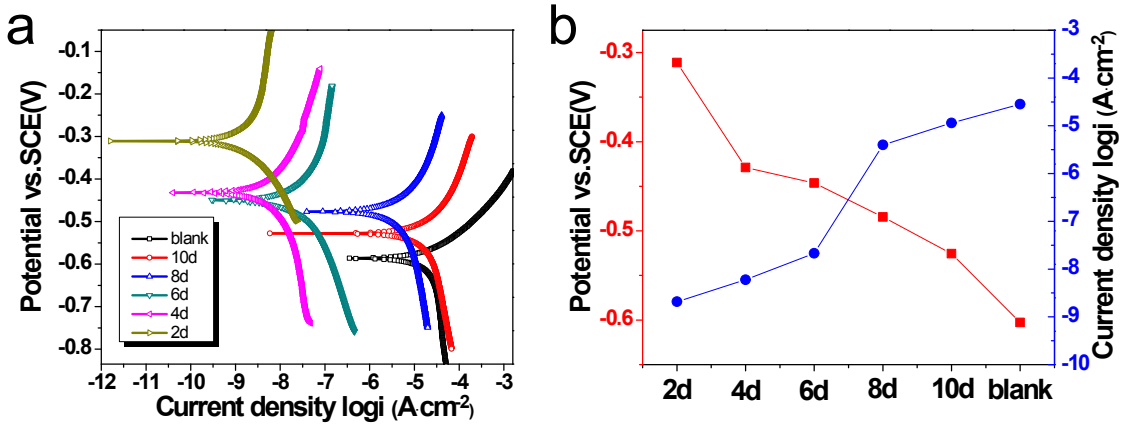


Figure S6. (a) Potentiodynamic polarisation curves of different immersion time in pH=1 hydrochloric acid aqueous solution. (b) Corrosion potentials and current densities panel of the samples with different immersion time

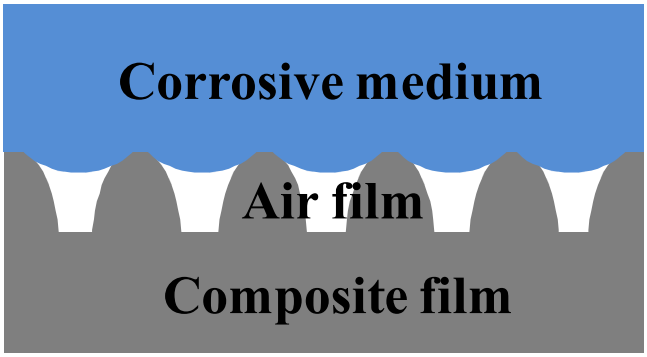


Figure S7. Interfacial model for chemical stability mechanism of the composite superhydrophobic coating in corrosive medium.

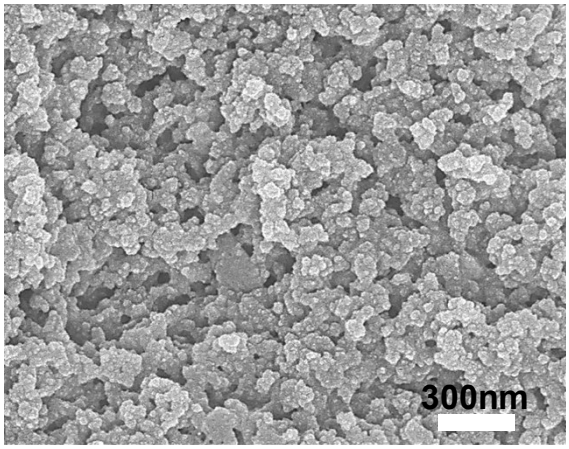


Figure S8. SEM image of the composite coating after immersion test for 6d.

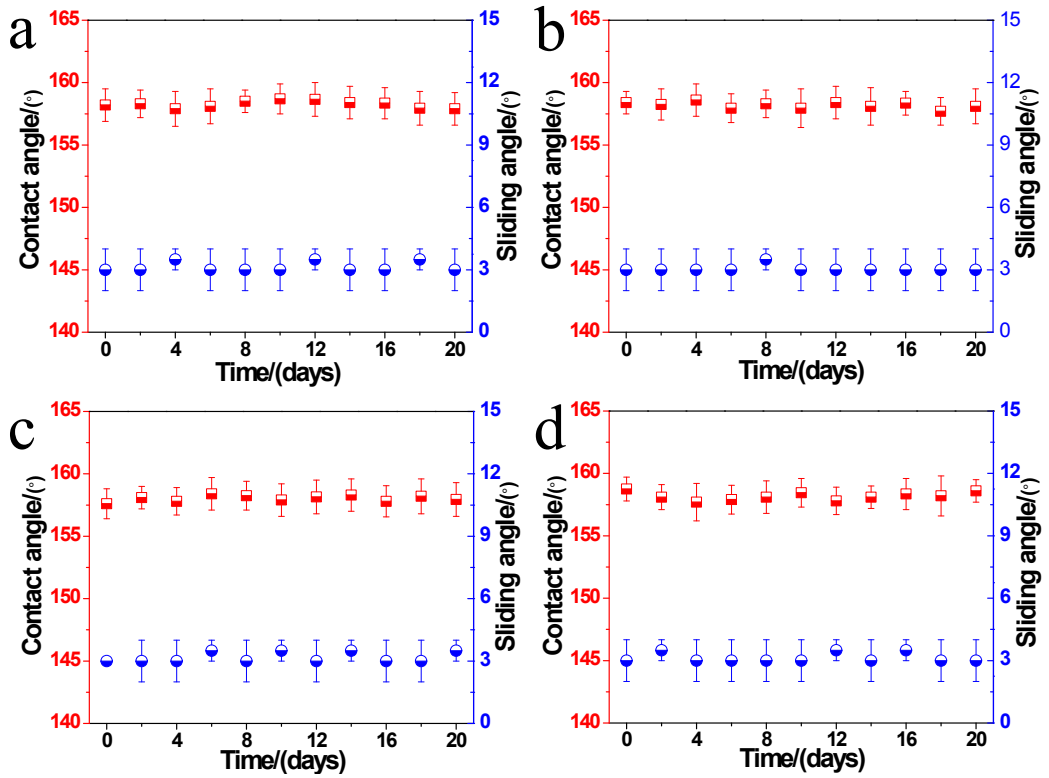


Figure S9. The water contact angles and sliding angles of the composite superhydrophobic coatings after solvent resistance tests for various time, a) acetone, b) butyl acetate, c) xylene, d) n-hexane.

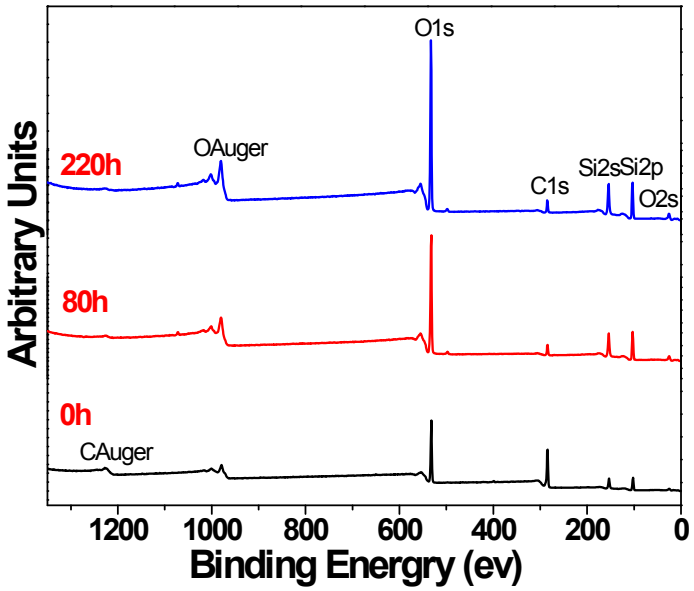


Figure S10. XPS spectra of the composite superhydrophobic coating before (0 hours) and after thermal stability test (annealed 80 and 220 hours at 400˚C).

Table S1. Surface composition of the composite superhydrophobic coating before and after thermal stability test (annealed 80 and 220 hours at 400˚C).

Sample	Atomic percent (atom%)		
	C	O	Si
0h	53.61	31.05	15.33
80h	11.86	56.65	31.49
220h	10.18	58.31	31.51

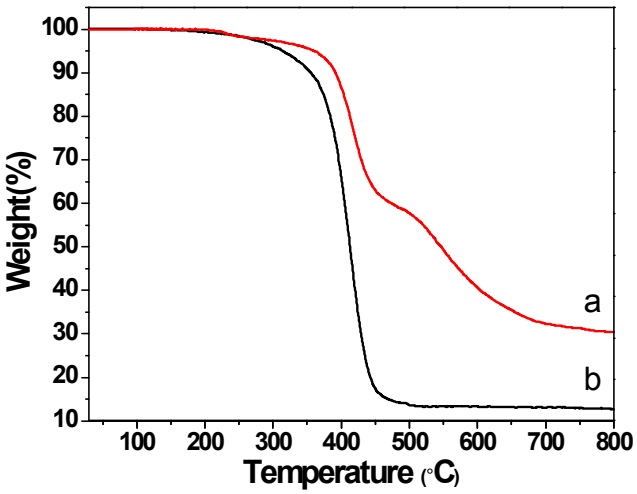


Figure S11. TGA curves of (a) the composite superhydrophobic coating, (b) the siloxane functionalized waterborne acrylic copolymer.

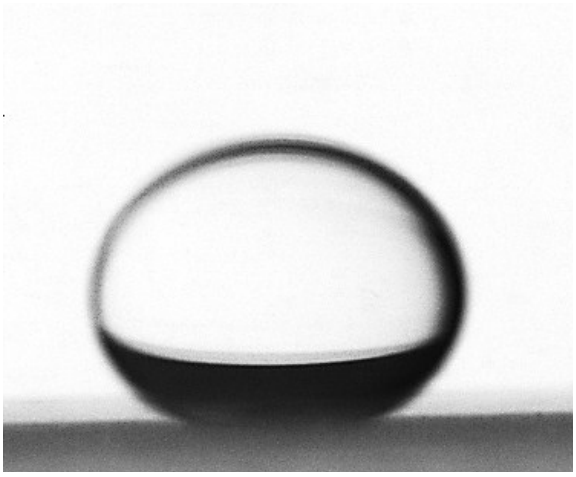


Figure S12. Image of a water droplet on the coated glass slide under oil, which still exhibits superhydrophobicity.

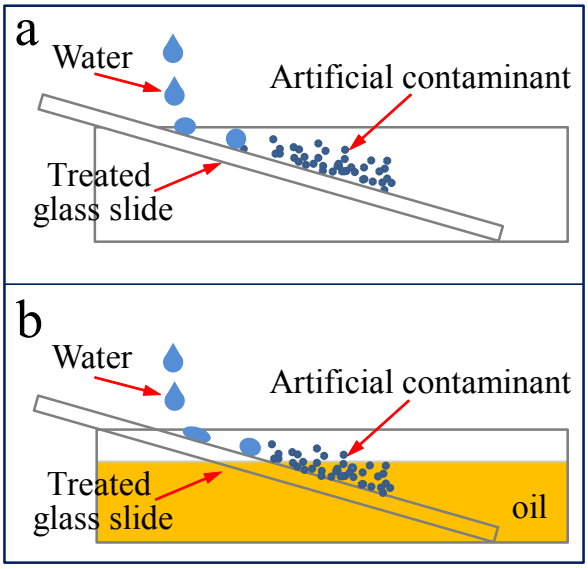


Figure S13. Schematic illustration of self-cleaning test. (a) Dirt removal test on coated surface in air. (b) Dirt removal test on oil-contaminated coated surface under oil.

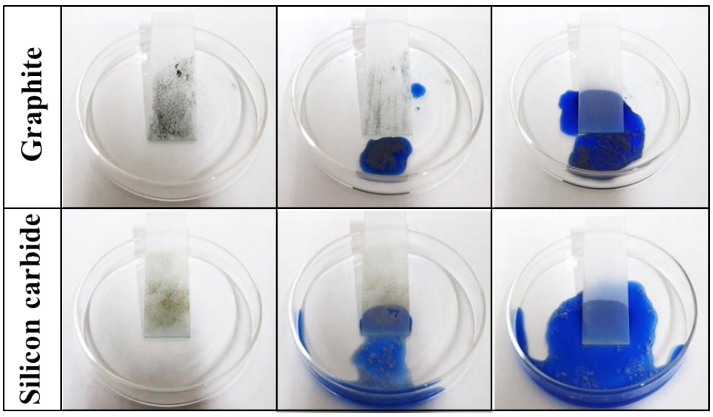
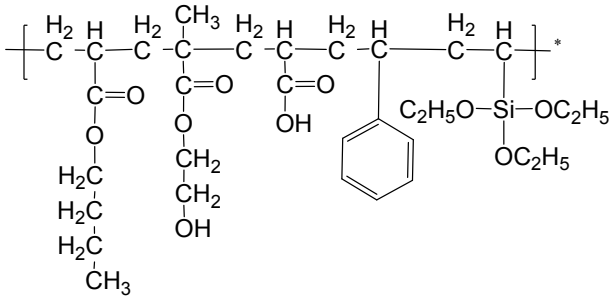


Figure S14. Self-cleaning action of the composite coatings performed on artificially contaminated surfaces with graphite and SiC particles in air.



Scheme S1. A schematic structure of typical silicone-acrylic copolymer

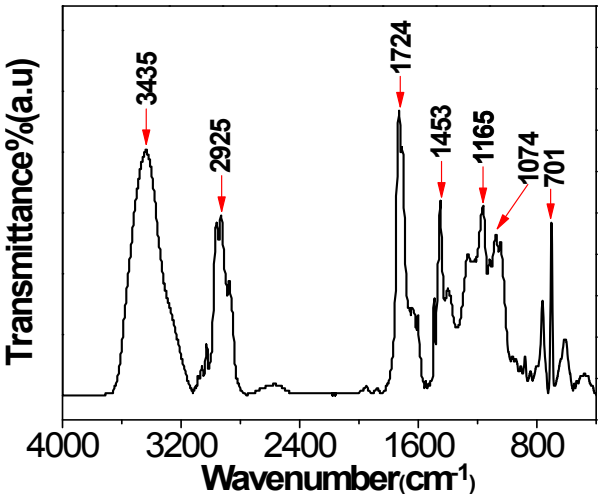


Figure S15. FT-IR spectrum of the silicone-acrylic copolymer (SAC)

Analysis on FT-IR result: The peak at 3435 cm^{-1} is assigned to the stretching vibration of –OH, while the peaks from 3100 cm^{-1} to 3000 cm^{-1} correspond to the stretching vibration of C–H on the benzene ring. The peak at 2925 cm^{-1} corresponds to the characteristic asymmetrical stretching vibration of –CH_2–, while the strong peak at 1724 cm^{-1} is attributed to the stretching vibration of C=O. The peak at 1453 cm^{-1} is due to the asymmetrical deformation vibration and symmetrical deformation vibration of –CH_3, whereas the peak at 1165 cm^{-1} is assigned to the stretching vibration of C–O–C from esters. Besides, there exists an obvious peak at 1074 cm^{-1}, which is well consistent with the characteristic stretching vibration peaks of Si-O-C.