

Electronic Supplementary Information for:

Robust Liquid-repellent Coatings Based on Polymer Nanoparticles with Excellent Self-cleaning and Antibacterial Performances

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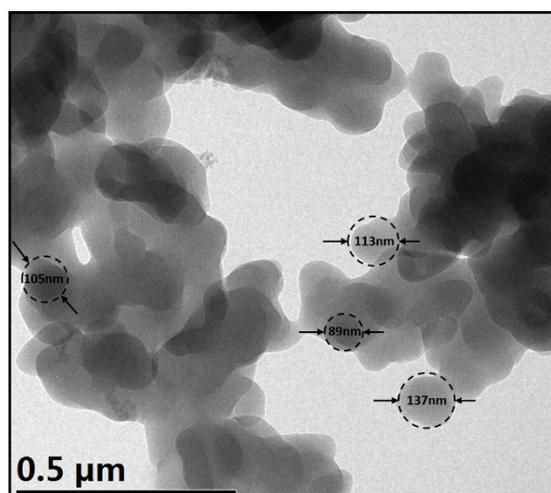
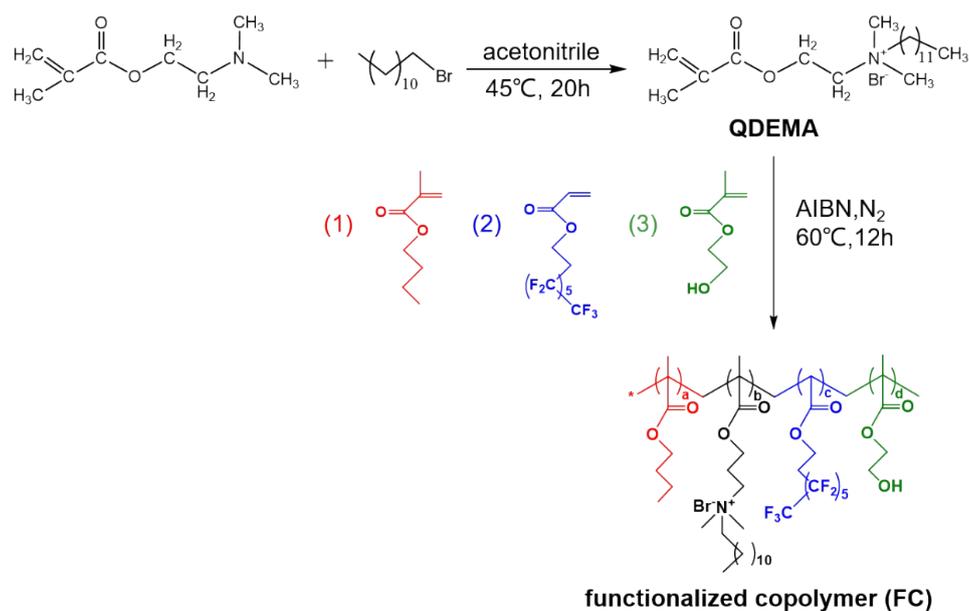


Fig. S1 TEM image of pristine PUF NPs. The average particle diameter of pristine PUF NPs is around 110 nm. This result also testified small clusters appeared on the coating surface (Fig. 2b) consisting of nanoparticles.



Scheme S1. Synthesis of FC copolymer.

Table S1 The thickness of PUF-FC nanocomposite films measured by Bruker's Stylus Profiler (DEKTAK-XT®, Boyue Instruments (Shanghai) Co., Ltd.). The thickness was slightly fluctuant from 29 to 31 μm , indicating that the thickness of PUF-FC nanocomposite films can be controlled by our spray method.

Sample	PUF-FC1	PUF-FC2	PUF-FC3	PUF-FC4
Thickness/ μm	30 ± 4	31 ± 2	30 ± 5	29 ± 3

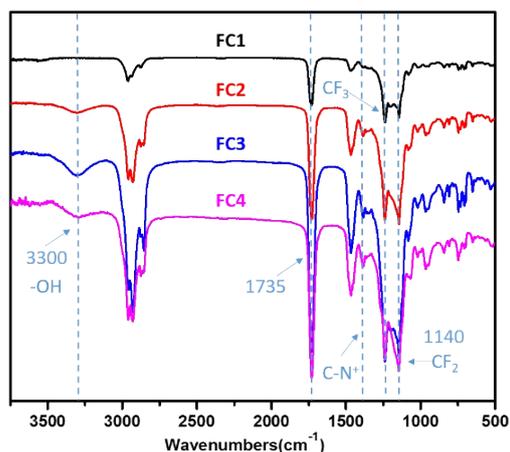


Fig. S2 FT-IR spectra of FC copolymers.

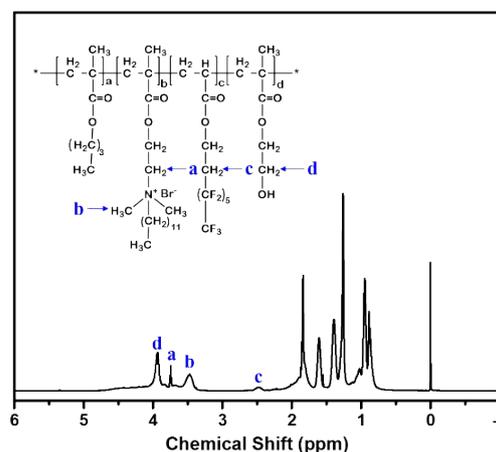


Fig. S3 ^1H -NMR spectra of FC2.

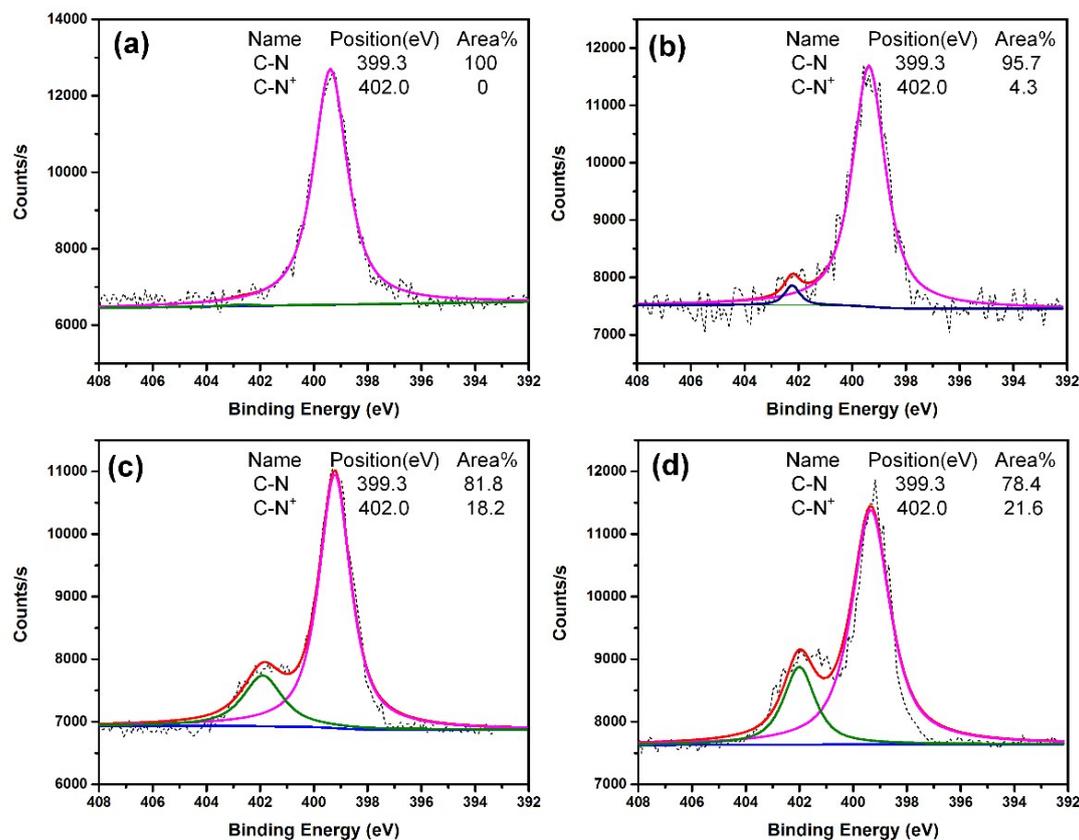


Fig. S4 N 1s core-level spectra of (a) PUF-FC1, (b) PUF-FC2, (c) PUF-FC3, and (d) PUF-FC4 coatings.

Table S2 Water Contact angle (WCA), and sliding angle (SA) of different copolymer surfaces achieved by CAM 200 optical contact-angle goniometer at room temperature.

Sample	Mass ratio ^a	WCA/ ^o	SA/ ^o
FC1	0:6	111.3±1.6	N/A ^b
FC2	2:4	106.9±1.8	N/A
FC3	3:4	106.0±1	N/A
FC4	3:3	105.2±1.5	N/A

^a Mass ratio represents the m (QDEMA): m (TFOA). ^b N/A: No angles were recorded. The droplet did not roll off even at a 90° tilting angle.

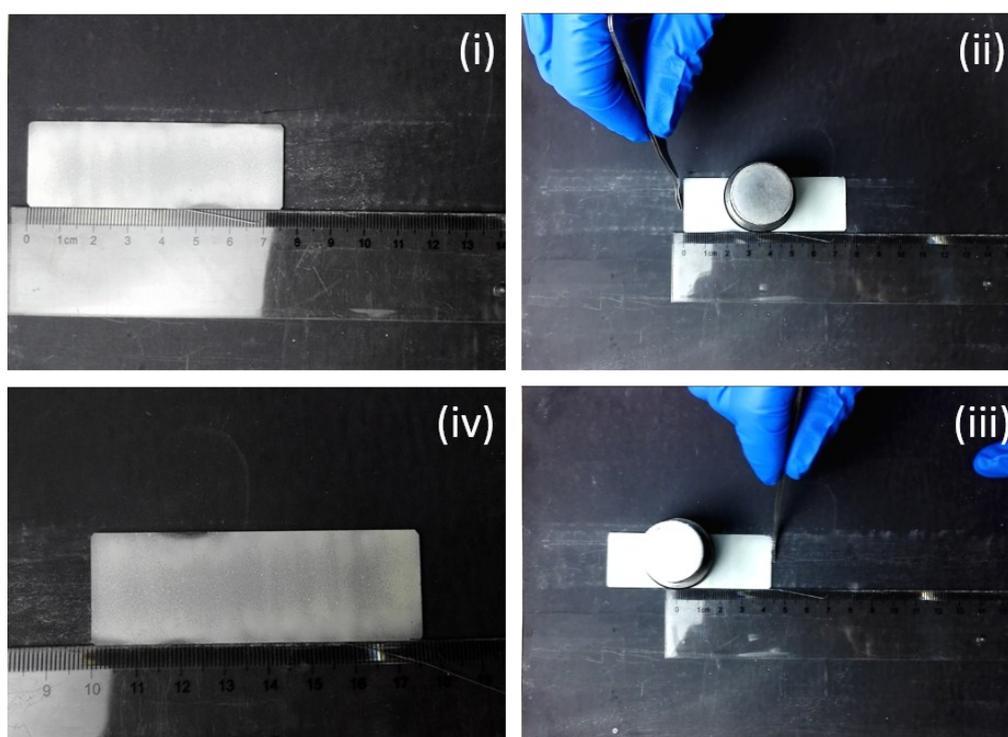


Fig. S5 Photographs of abrasion process carried out on PUF-FC2-coated glass slide. The glass slide was placed on the sand paper (i), then the surface was faced to the sand paper and moved forth (ii) and back (iii) along the ruler. After cycles of abrasion test, there was no scratches appeared on the surface (iv).

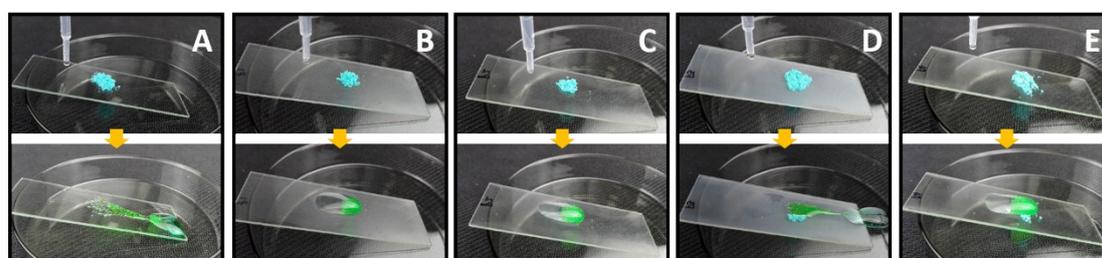


Fig.S6 Comparative trail for self-cleaning test using copper (II) chloride dehydrate particles contaminating the surfaces. Image A, B, C, and D was taken before (top) and after (bottom) drops of water rolling off the surface of glass, FC1, FC2, FC3 and FC4, respectively. The tilt angle of the surface was about 18°.

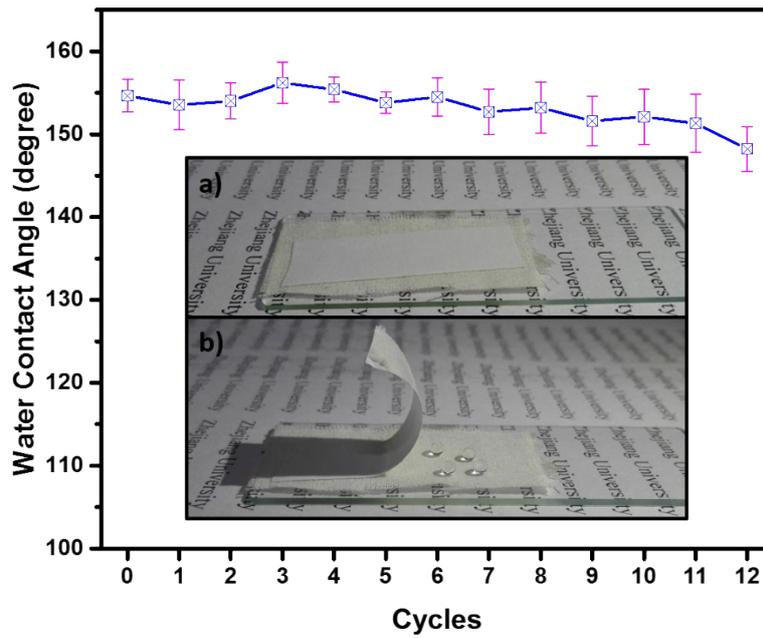


Fig. S7 Plot of mechanical stability assessed by adhesive tape pressing and water contact angles after each test. New adhesive tape was used for each new cycle. Inserted image a) and b) showed PUF-FC-coated cotton surface before and after 12th adhesive tape pressing, respectively.