Electronic supplementary information (ESI)

A Facile Route to Mechanically Durable Responsive Surfaces with Reversible Wettability Switching

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Experimental details

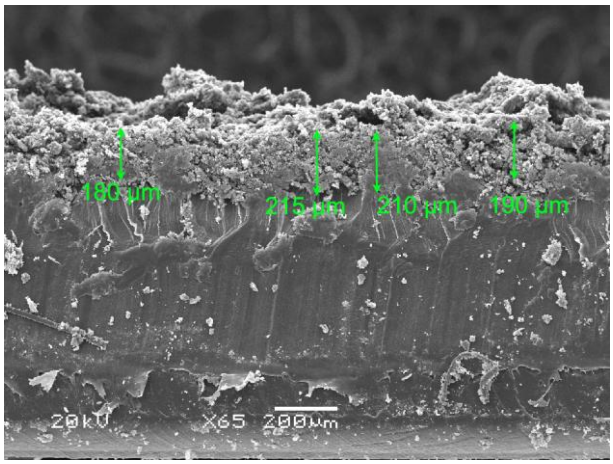

Figure S1 shows the cross section of the CNTs/UHMWPE composite film.

The content of CNTs embedded in the ultra-high molecular weight polyethylene (UHMWPE) is 0.08 g, because a part of CNTs not embedded in the UHMWPE substrate has been removed by ultrasonically cleaned with ethanol, and the content of CNTs on the polymer surface was 0.015 g. It was found that the embedding depth of

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CNTs in the UHMWPE substrate was about 200 μm (see Figure S1), and the content of Ag dispersing on CNTs was 0.032g.

The effect of CNTs loading on the surface wettability is shown in Figure S2. The samples with different CNTs loading are all modified by Ag deposition and fluorination process. It can be seen that the UHMWPE surface without CNTs loading can only reach to hydrophobic sate (CA = 110^{o}) after Ag deposition and surface fluorination process. The water repellency of the CNTs/UHWMPE composite surface improved with increasing the CNTs loading from 0.04 g to 0.08 g, and then kept invariable with CNTs loading increasing.

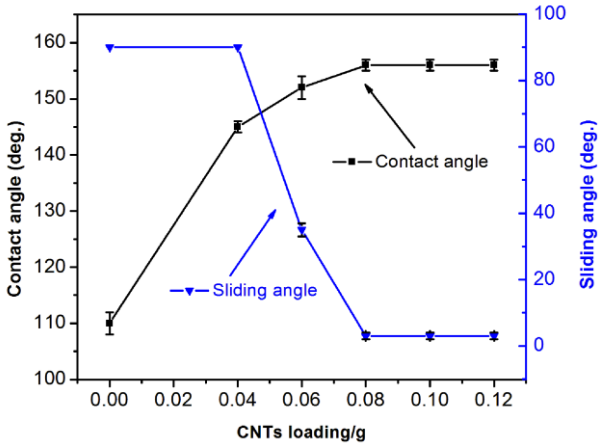

Figure S2. Contact angle and sliding angle of the samples after Ag deposition and surface fluorination as a function of CNTs loading.

XPS and XRD analysis

After Ag deposition, the peaks for Ag 3d positioned at 368 eV and 374 eV, as shown in Figure S1a, are detected, denoting presence of Ag on the composite surface. Figure S1b shows the XRD pattern of the structured Ag film. Four diffraction peaks, positioned at2θ of 30-80^{o}, are indexed as crystal faces (111), (200), (220), and (311)

of silver, according to the work described previously.[1]

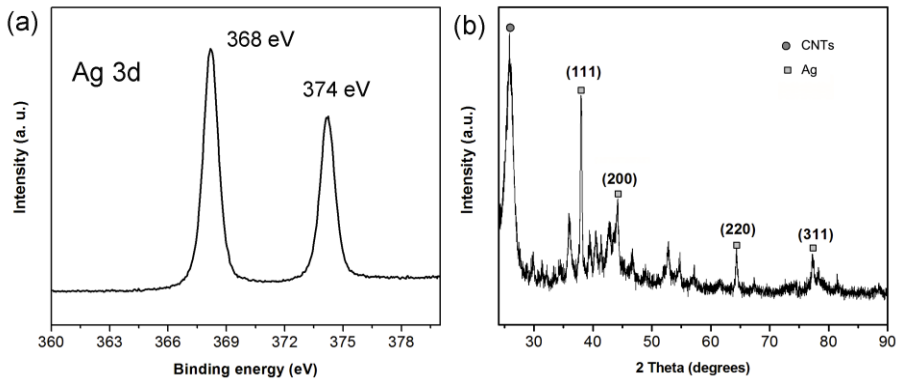

Figure S3 shows the (a) Ag 3d XPS spectra and (b) XRD pattern that originate from the composite coating after Ag deposition.

FTIR analysis

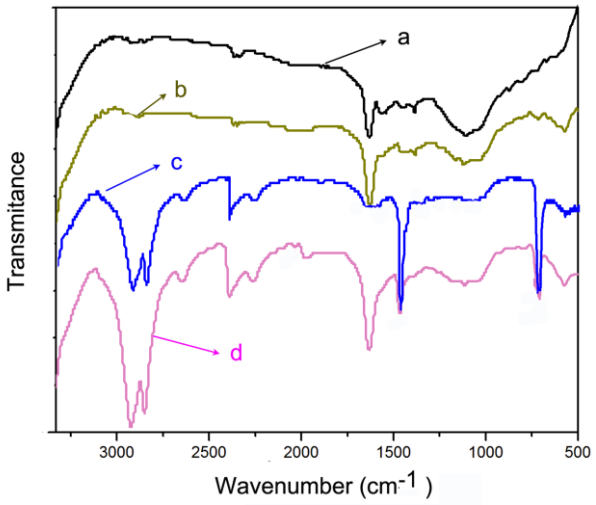

Figure S4. FTIR spectra of (a) CNTs, (b) CNTs/Ag, (c) UHMWPE, and (d) UHMWPE/CNTs composite film. Fourier transform infrared (FTIR) spectra were collected on a Bruker IFS66 V/S spectrometer.

Figure S4 shows the FTIR spectra of CNTs, CNTs/Ag, UHMWPE, and UHMWPE/CNTs composite. It can be seen that the characteristic peaks of CNTs are still observed after Ag deposition and have no chemical shifts, and the characteristic

peaks of UHMWPE in the CNTs/UHMWPE composite is identical to characteristic peaks of UHMWPE. Theses results indicate that there is no chemical bond between CNTs and Ag and between UHMWPE and CNTs.

Reference

1 T. J. Yao, C. X. Wang, Q. Lin, X. Li, X. L Chen, J. Wu, J. H. Zhang, K. Yu, B. Yang, *Nanotechnology*, 2009, **20**, 065304.