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Supporting Information

Transparent and abrasion-resistant superhydrophobic coating with robust self-cleaning function in either air or oil

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Figure S1. The picture of ZBQ four sides wet-film preparation device

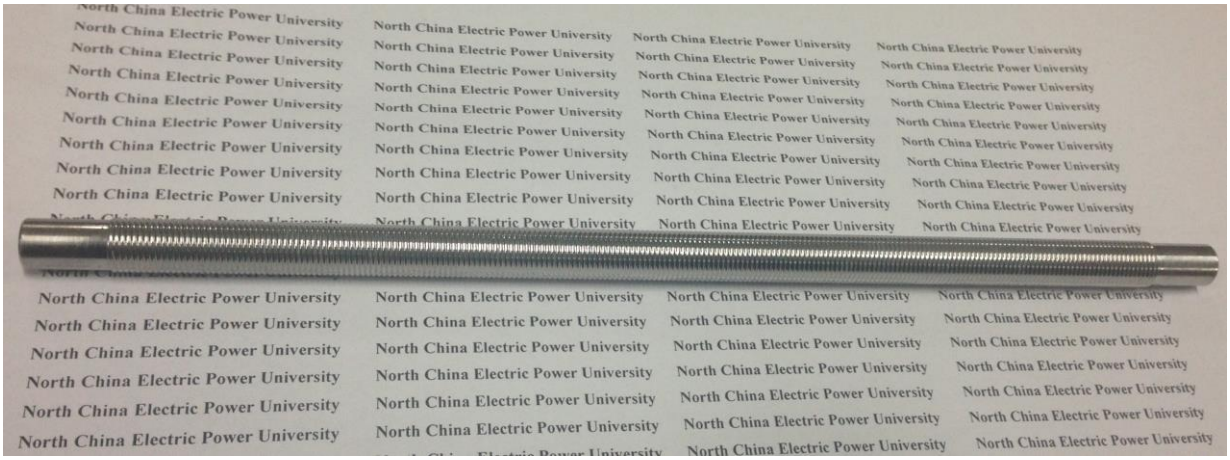

Figure S2. The picture of OSP-100 scraping ink bar

Figure S3. Photograph of a FTSN coated glass slide when the ratio of nanoparticles to ethanol is 1:10(w:w). The coated glass slide was placed on a printed paper.

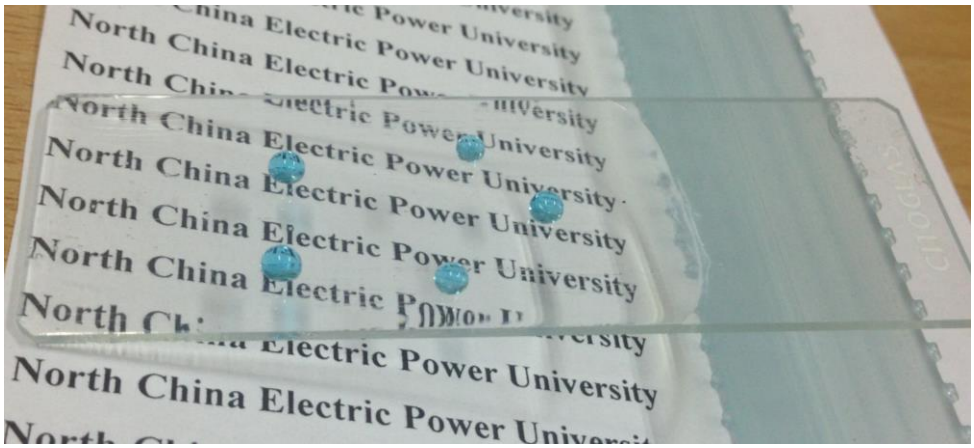

Figure S4. Photograph of water droplets on a FTSN coated glass slide after half cycle of abrasion test when the ratio of nanoparticles to ethanol is 1:100(w:w).

S5 The stability in the outdoor exposure

We further examined the outdoor performance of the FTSN deposited glass substrate. The outdoor exposure test was performed at Baoding (China). When performing the outdoor exposure test, the temperature range is -10-10 °C and the humidity is 31-59%. As shown in Fig. S5, the sample exhibited stable superhydrophobicity after 7 days outdoor exposure.

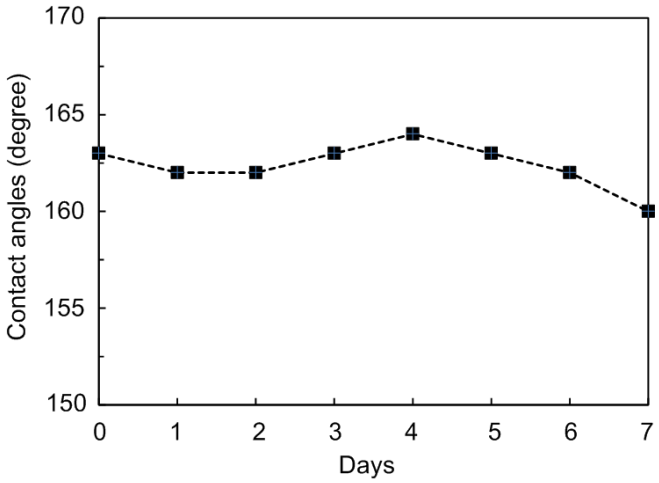

Figure S5. Changes in water contact angles under outdoor exposure test for FTSN deposited glass substrate.

S6 The surface chemical composition

The surface chemical composition of the FTSN deposited substrate was analyzed by XPS (Thermo ESCALAB 250XI, USA) at room temperature, and the binding energies were calibrated with respect to the signal for adventitious carbon (284.8 eV). Fig. S6a shows the survey spectra of the sample. It can be found that the Si 2p,Si 2s, C 1s, O 1s and F 1s peaks are detected from the surface. Fig. S6b shows curve-fitted F 1s core-level spectra of the sample. A dominant peak appearing at 689.2 eV corresponds to fluorine bonded as CF_x in the FAS chain indicating that F is present in same bonding environment as that of FAS[1-3]. A shoulder peak at higher binding energy of 690.6 eV could be associated with Si-F_x interaction[4]. This confirms the presence of fluoride groups on the silica particles[2]. Curve-fitted Si 2p core-level spectra of the sample are showed in Fig. S6c. Si 2p core-level spectra shows a dominant peak at 103.2 eV, which corresponds to SiO_2-based network[5,6]. Low-intense component peak around 104.3 eV could be due to -Si-OH or Si-F_x species[7]. Fig. S6d shows the multi-element spectra of C 1s, observed peaks at 284.0, 284.9, 286.3, 287.4, 290.9 and 292.8 eV are ascribed to C-Si, C-C, C-O, C-CF, CF_2 and CF_3, respectively[2,8].

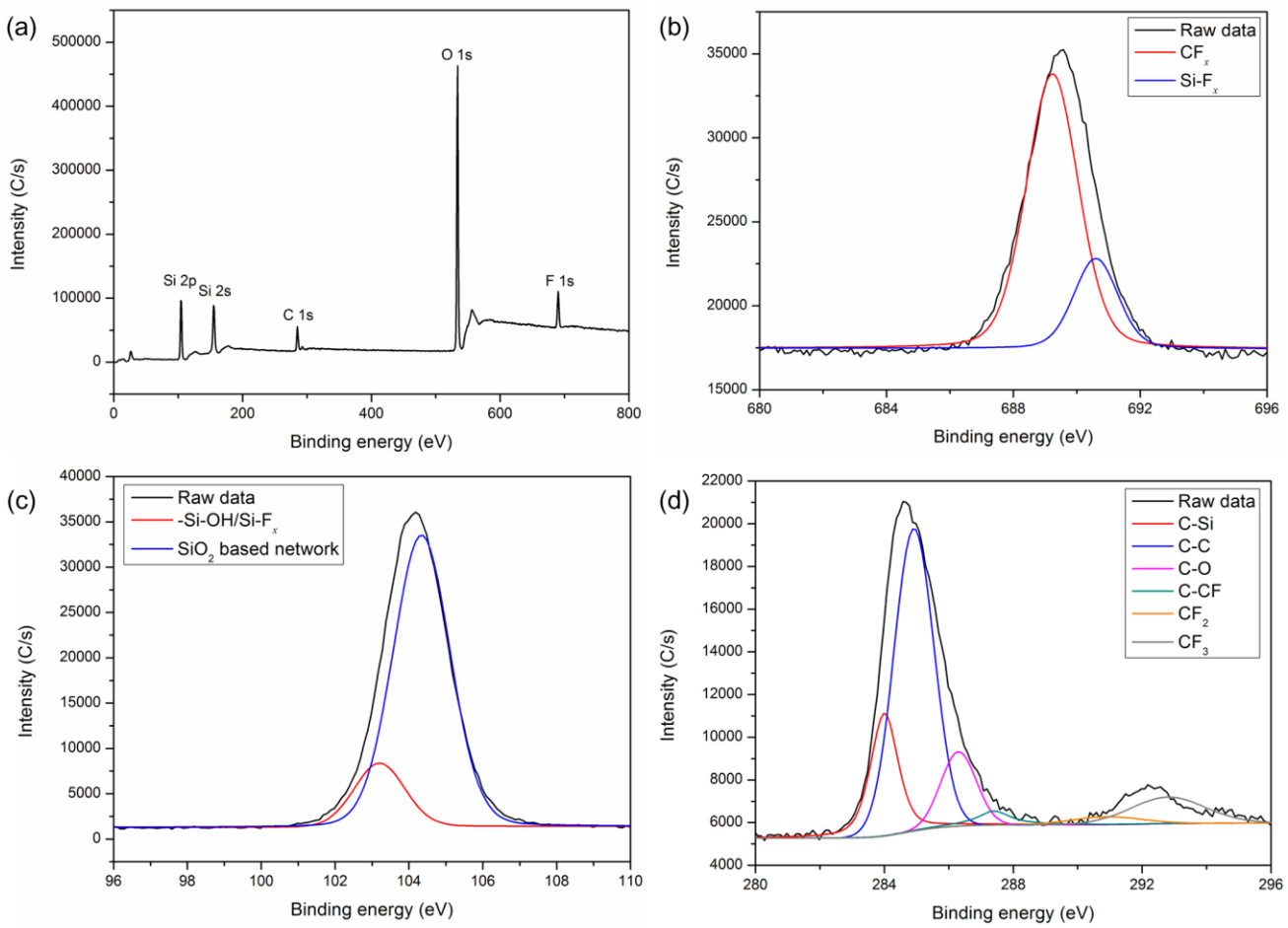

Figure S6. (a) Survey XPS spectrum of the FTSN deposited glass substrate; (b) F 1s，(c) Si 2p and (d) C 1s XPS spectrum of the sample.

S7 The pendulum hardness test

The pendulum hardness of the fully-cured PDMS coatings was measured to be 81 s using a QBY Pendulum apparatus made by Tianjin Instrument Co., China [9,10].

References

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