Supplementary Information

Inorganic adhesives for robust, self-healing, superhydrophobic surfaces

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Fig. S1  SEM images of original substrates.
Fig. S2  (a) XPS spectra of original and AP-TiO$_2$@OTS coated ceramic. (b) XRD patterns of original and AP-TiO$_2$@OTS coated ceramic. (c) Element distribution maps of AP-TiO$_2$@OTS coated ceramic.
Fig. S3  (a) XPS spectra of original and AP-TiO$_2$@OTS coated fabric. (b) XRD patterns of original and AP-TiO$_2$@OTS coated fabric.

Fig. S4  (a) XPS spectra of original and AP-TiO$_2$@OTS coated nickel foam. (b) XRD patterns of original and AP-TiO$_2$@OTS coated nickel foam.
Fig. S5  (a) XPS spectra of original and AP-TiO$_2$@OTS coated SSM. (b) XRD patterns of original and AP-TiO$_2$@OTS coated SSM.
Fig. S6  Cross-section SEM image and element distribution maps of AP-TiO$_2$@OTS coated glass.
Fig. S7  Photographs and SEM images of the coated ceramic after 100 abrasion cycles.
Fig. S8  Photographs and SEM images of the coated fabric after 100 abrasion cycles.
Fig. S9  Photographs and SEM images of the coated SSM after 100 abrasion cycles.

![Element distribution maps of the coated glass and SSM](image)

Fig. S10  Element distribution maps of the AP-TiO$_2$@OTS coated glass and SSM after 100 abrasion cycles.
Fig. S11  Photographs and SEM images of the AP-TiO$_2$@OTS coated glass after treatment in hot oil and then 100 abrasion cycles.
Fig. S12  Photographs and SEM images of the AP-TiO$_2$@OTS coated ceramic after treatment in hot oil and then 100 abrasion cycles.
Fig. S13  Photographs and SEM images of the AP-TiO$_2$@OTS coated fabric after treatment in hot oil and then 100 abrasion cycles.
**Fig. S14**  Photographs and SEM images of the AP-TiO$_2$@OTS coated SSM after treatment in hot oil and then 100 abrasion cycles.

**Glass**

![Element distribution maps of Glass](image)

**SSM**

![Element distribution maps of SSM](image)

**Fig. S15**  Element distribution maps of the AP-TiO$_2$@OTS coated glass and SSM after treatment in hot oil and then 100 abrasion cycles.
Fig. S16  Photographs and SEM images of the AP-TiO$_2$@OTS coated glass after treatment in hot water and then 100 abrasion cycles.
Fig. S17  Photographs and SEM images of the AP-TiO$_2$@OTS coated ceramic after treatment in hot water and then 100 abrasion cycles.
**Fig. S18** Photographs and SEM images of the AP-TiO$_2$@OTS coated fabric after treatment in hot water and then 100 abrasion cycles.

**Fig. S19** Photographs of the AP-TiO$_2$@OTS coated SSM after treatment in hot water and then 100 abrasion cycles.
**Fig. S20** Element distribution maps of the AP-TiO$_2$@OTS coated glass after treatment in hot water and then 100 abrasion cycles.
Fig. S21  SEM images and element distribution maps of the AP-TiO$_2$@OTS coated SSM (position 1) after treatment in hot water and then 100 abrasion cycles.
Fig. S22  SEM images and element distribution maps of the AP-TiO$_2$@OTS coated SSM (position 2) after treatment in hot water and then 100 abrasion cycles.
Fig. S23  SEM images and element distribution maps of the AP-TiO$_2$@OTS coated SSM (position 3) after treatment in hot water and then 100 abrasion cycles.
Fig. S24  Photographs and SEM images of the AP-TiO$_2$@OTS coated glass after treatment in hot acetone and then 100 abrasion cycles.
Fig. S25  Photographs and SEM images of the AP-TiO$_2$@OTS coated ceramic after treatment in hot acetone and then 100 abrasion cycles.
Fig. S26  Photographs and SEM images of the AP-TiO$_2$@OTS coated fabric after treatment in hot acetone and then 100 abrasion cycles.
**Fig. S27**  Photographs and SEM images of the AP-TiO$_2$@OTS coated SSM after treatment in hot acetone and then 100 abrasion cycles.

**SSM**

**Fig. S28**  Element distribution maps of the AP-TiO$_2$@OTS coated SSM after treatment in hot acetone and then 100 abrasion cycles.

**Fig. S29**  A water droplet on the surface of AP-TiO$_2$@OTS coated fabric after the Span 80 adhesion and then 1-h UV light irradiation. The intensity and wavelength of UV light are 30 W and 254 nm, respectively. The distance between the AP-TiO$_2$@OTS coated fabric and UV lamp is about 15 cm.
Fig. S30  Self-cleaning process of the AP-TiO$_2$@OTS coated ceramic to repel muddy water, coffee water, and coca cola.

Fig. S31  Photograph of the coated nickel foam (about 0.4 g) with a loading of 4 g weights.
Fig. S32  Photographs of water-in-oil emulsions before and after emulsion separation.

Fig. S33  (a) Photograph of semi-transparent AP-TiO$_2$@OTS coated glass in air. (b) Photograph of semi-transparent AP-TiO$_2$@OTS coated glass in hexane. (c) Water droplets on the surface of semi-transparent AP-TiO$_2$@OTS coated glass. (d) Transmittance of original glass, semi-transparent AP-TiO$_2$@OTS coated glass in air and in hexane.
Fig. S34  (a) Photograph of glass painted directly by the AP-TiO$_2$@OTS coating. (b) A water droplet on the surface of glass painted directly by the AP-TiO$_2$@OTS coating. (c, d) Photographs of glass painted directly by the AP-TiO$_2$@OTS coating before (c) and after (d) 100 abrasion cycles with sandpaper.

**Movie S1**  A water droplet rolls down along the inclined surfaces of AP-TiO$_2$@OTS coated glass, ceramic, fabric, nickel foam, and SSM.

**Movie S2**  A water droplet quickly spreads on the surface of the plasma-treated fabric.

**Movie S3**  Self-cleaning process of the AP-TiO$_2$@OTS coated ceramic to repel muddy water, coffee water, and coca cola.

**Movie S4**  Oil-water separation process using AP-TiO$_2$@OTS coated fabric.