UltraStable and Durable Silicone Coating on Polycarbonate Surface Realized by Nanoscale Interfacial Engineering

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Note:

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The authors declare no competing financial interest.

1. Supporting Experimental Details

1.1 Fabrication of neat PC sheet

Neat PC sheets with dimension of 50 mm × 50 mm × 3mm were fabricated using an injection molding machine (HTF80-W2, Haitian, China) with a processing temperature of 280 °C, a mold temperature of 80 °C, and an injection pressure of 100 MPa.

1.2 UVC surface treatment of PC sheet

To increase the surface energy, PC sheets were treated with UVC light using a UVC lamp (Philips, PL-L, 36w, main spectral peak: 254 nm) for up to 4 h in a darkroom. The lamp was fixed at 20cm above the samples.

1.3 Supporting characterization details

The surface topography of UVC treated PC sheets was evaluated using Atom force microscope (AFM, MultiMode8, Bruker, Germany) using a tapping mode. The chemical composition of UVC treated PC sheets and the silicone coating layer was measured using Fourier transform infrared spectroscopy (FTIR, Nicolet 6700, Thermo Scientific, USA).

2. Supporting Figures

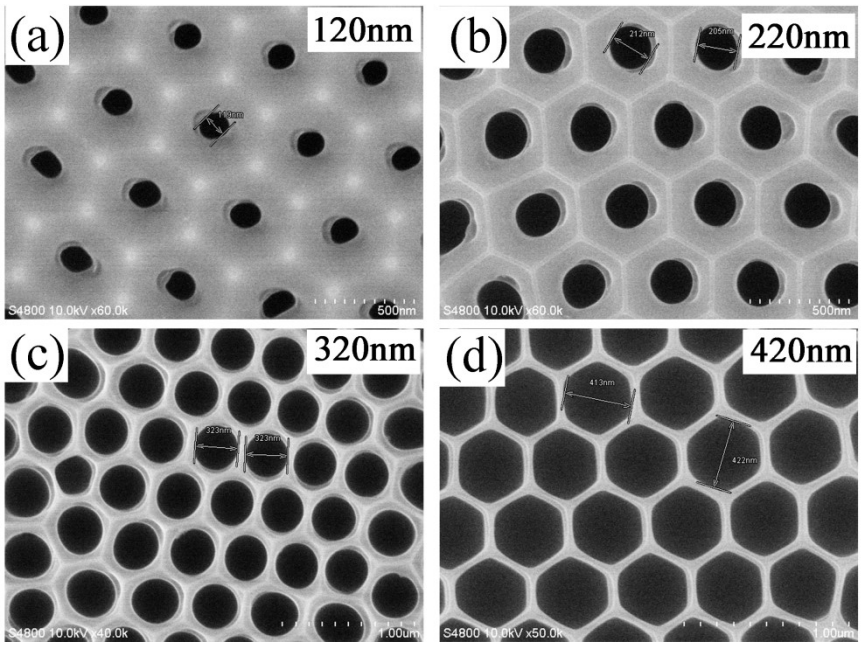

Figure S1. SEM images showing the morphology of different AAO templates with average pore diameter range from 120 to 420 nm.

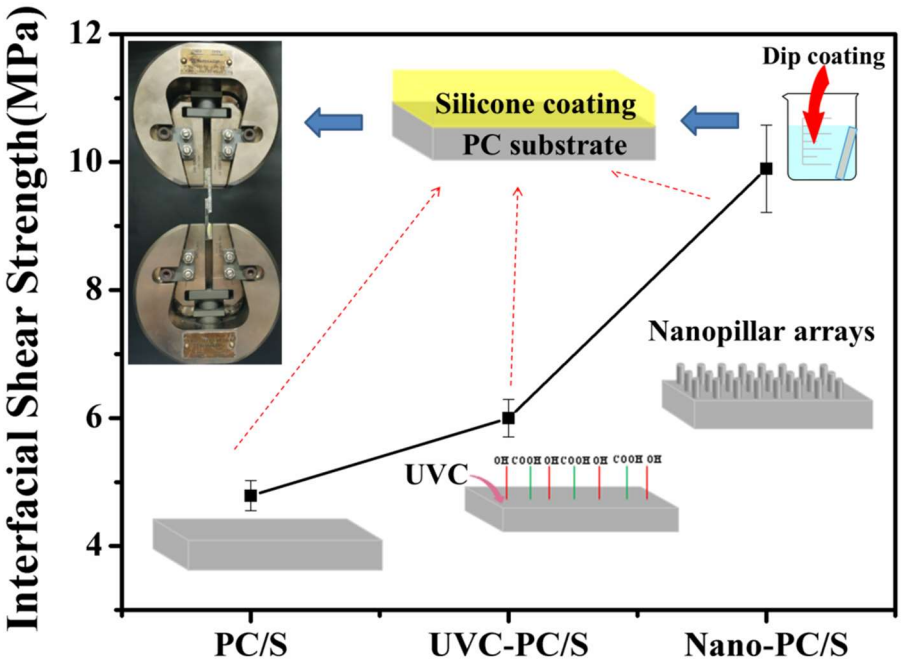

Figure S2. Interfacial shear strength (ISS) of silicone coating on PC, UVC-PC and Nano-PC sheets.

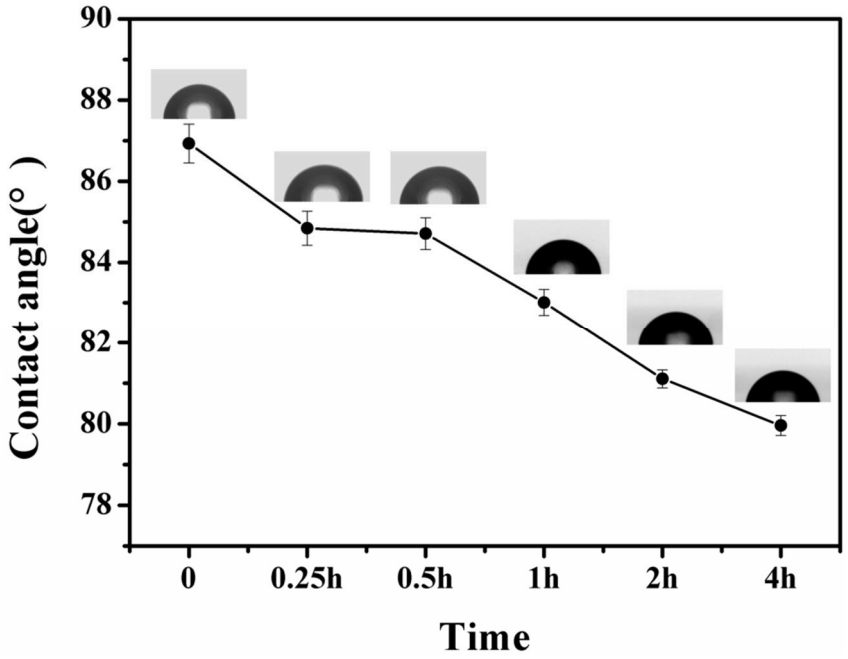

Figure S3. Water contact angle of PC sheets treated with UVC for different time.

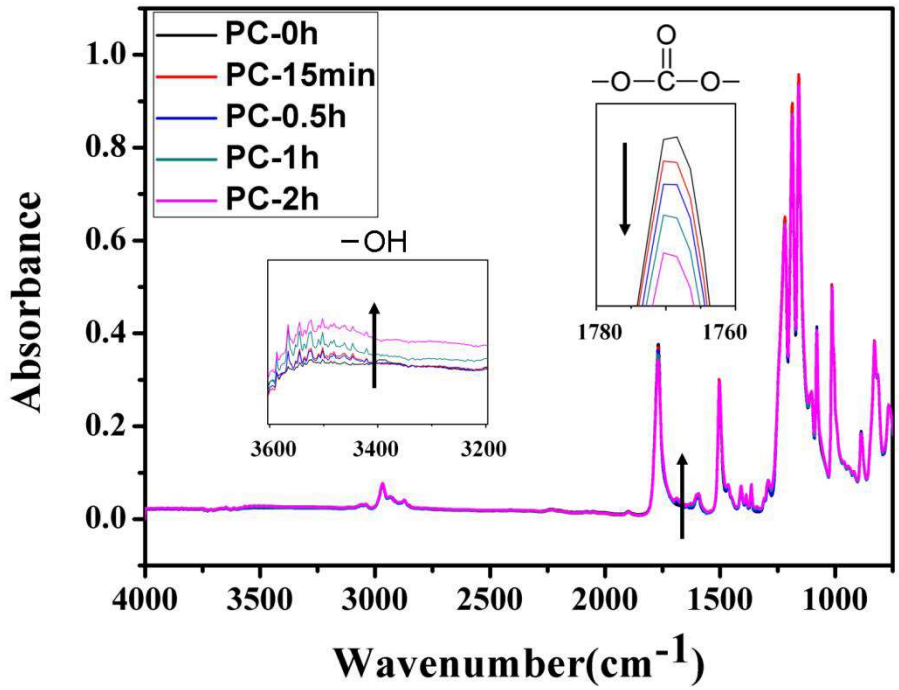

Figure S4. Fourier transform infrared spectroscopy (FTIR) results of PC sheets treated with UVC for different time.

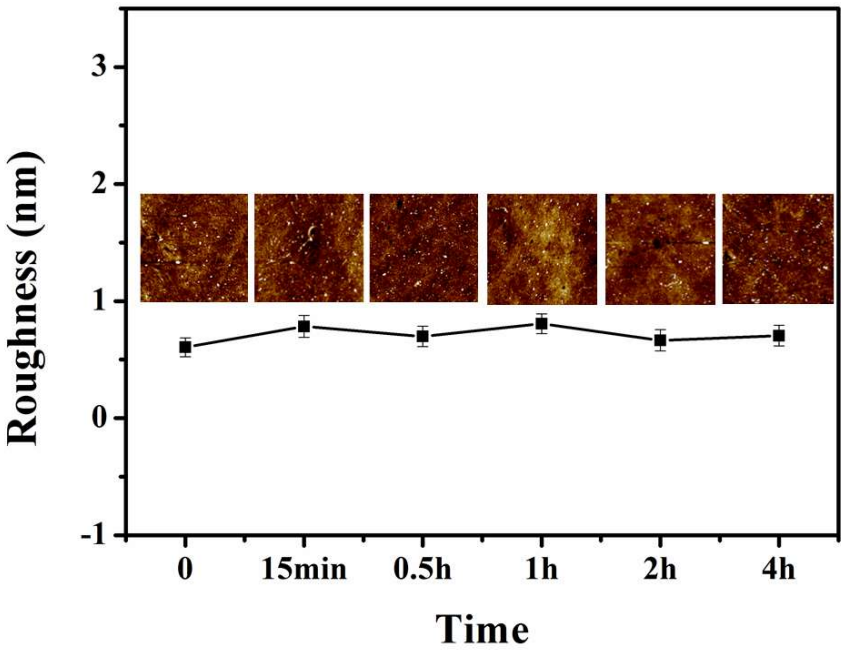

Figure S5. Atom force microscope (AFM) images and surface roughness results of PC sheets treated with UVC for different time.

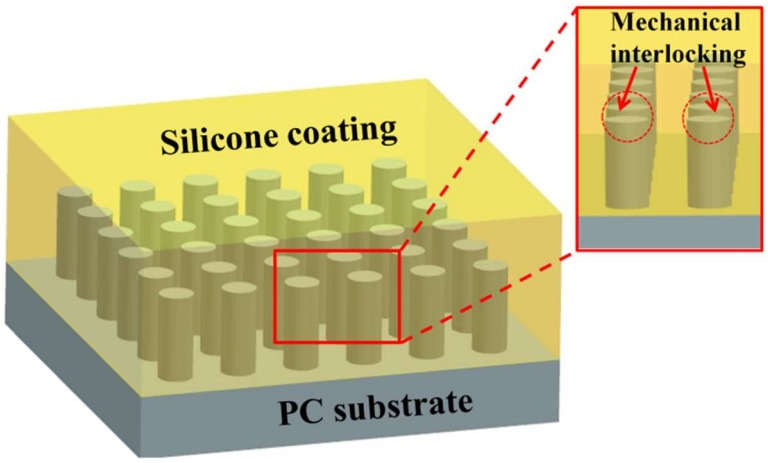

Figure S6. Schematic of mechanical interlocking behavior of silicone coating on nanostructured PC substrate.

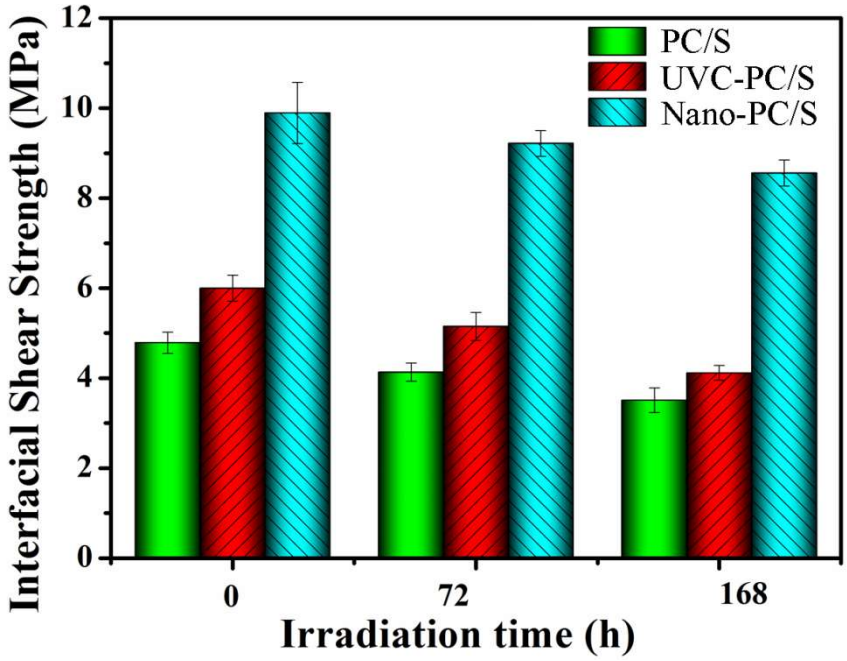

Figure S7. Interfacial shear strength results of PC/S, UVC-PC/S, and Nano-PC/S after expose to UV irradiation for up to 168 h.

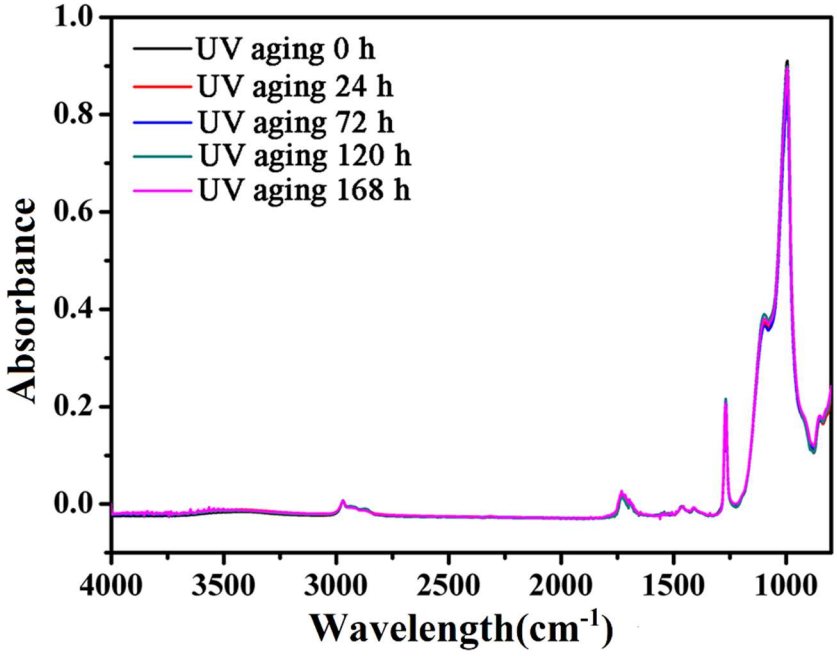

Figure S8. FTIR spectra of silicone coating on Nano-PC/S after UV irradiation for different time.

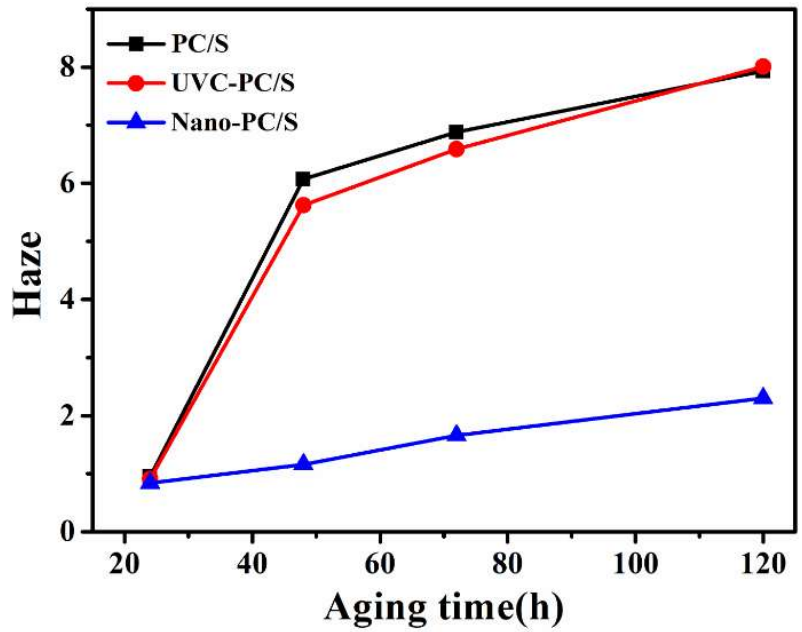

Figure S9. Change of haze for PC/S, UVC-PC/S, and Nano-PC/S during hydrothermal aging for up to 120 h.

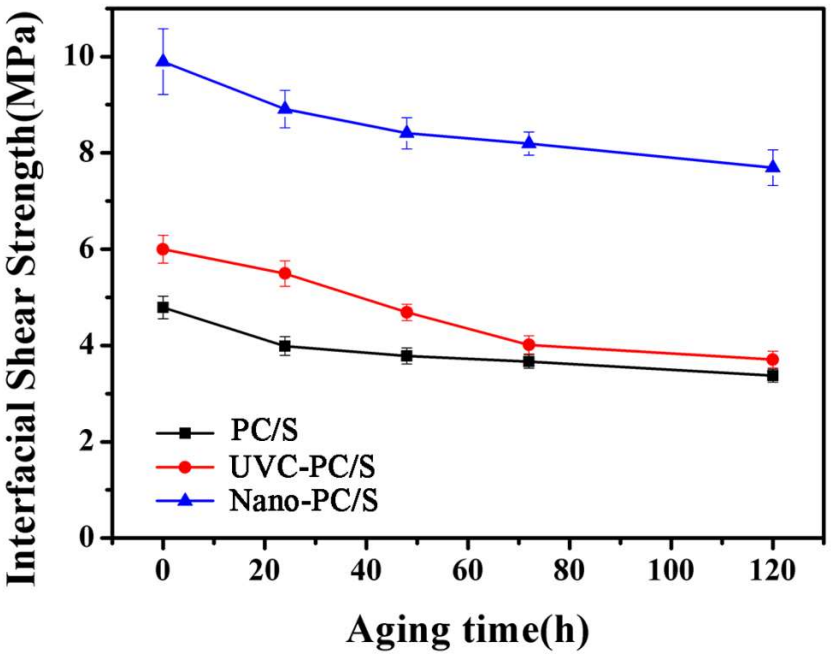

Figure S10. Change of ISS for PC/S, UVC-PC/S, and Nano-PC/S in the lap shear test during hydrothermal aging for up to 120 h.

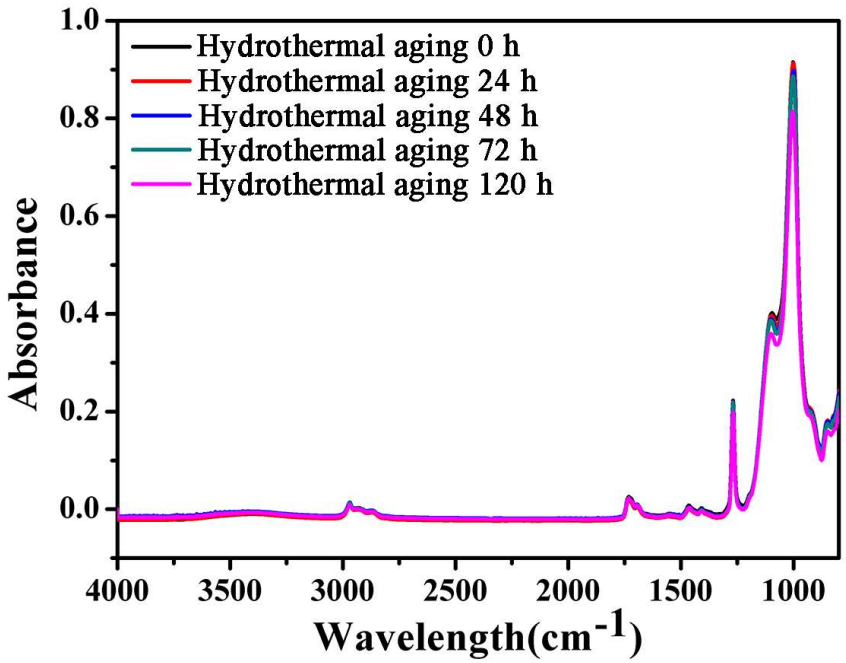

Figure S11. FTIR spectra of silicone coating on Nano-PC/S after hydrothermal aging for different time.