Fabrication of Robust Superhydrophobic Surfaces via Aerosol-Assisted CVD and Thermo-Triggered Healing of Superhydrophobicity by Recovery of Roughening Structures

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Figure S1. SEM images of (a)(b) EP₃@glass, (c)(d) PDMS₃@glass.



Figure S2. (a-c) are the optical images of dyed water droplets on copper mesh, aluminium plate and filter paper, respectively.



Figure S3. The cross-sectional SEM images of $(EP/PDMS)_n$ @glass of different deposition cycles: (a) 1 cycle, (b) 2 cycles (c) 3 cycles, (d) 4 cycles, (e) 5 cycles, (f) the corresponding optical images of $(EP/PDMS)_3$ @glass showing visible transparency.



Figure.S4 The relationship between deposition cycles and coating thickness.



Figure S5. (a) The cross-sectional SEM images of pristine $(EP/PDMS)_n@glass$, (b) the cross-sectional SEM images of $(EP/PDMS)_n@glass$ after 2 meter sandpaper abrasion, (c) the cross-sectional SEM images of $(EP/PDMS)_n@glass$ after 200 cycles double-sided tape peeling.



Figure S6. The surface morphology and CA images of (a) (EP/PDMS)₃@glass after knife scratching, (b) (EP/PDMS)₃@glass after knife scratching and double side tape peeling.



Figure S7. The SEM images of (EP/PDMS)₃@glass after different pencil hardness test: (a) 2H, (b) 3H, (c) 4H, (5) 5H.



Figure S8. CAs of the (EP/PDMS)₃@glass treated by immersion in different pH solutions for 30 days.



Figure S9. The chemical structures of (a) Diglycidyl ether of Bisphenol A (DGEBA),(b) Neopentyl glycol diglycidyl ether (NGDE), (c) poly(propylene glycol)bis(2-amino-propyl) (D230)

Shape Memory Evaluation: Shape fixity (R_f) and shape recovery (R_r) were evaluated by comparing the bending angle, fixed angle, and recovered angle (Figure S5). Samples were heated at 85°C and bend to 180° (bending angle) and then quenched in ice water for 1 min. The fixed angle was measured afterwards. The fixed shape memory polymer was then heated at 85°C, the final angle was measured as the recovered angle. The R_f and R_r was calculated by the following formulas:

$$R_f = \frac{180 - \alpha}{180} \times 100\%$$
 (1)

$$R_r = \frac{\theta}{180} \times 100\%$$
 (2)



Figure S10. Schematic illustration of measurement of shape memory fixed angle (a) and shape memory recovered angle (b).

Item	Shape fixed angle	R _f	Shape recovered angle	R _r
Results	179°	99.4%	177.3°	98.5%

 Table S1 shape memory effect of shape memory epoxy resin



Figure S11. Heat-induced shape-memory effects of epoxy resin polymer.



Figure S12. SEM images of (a) crushed $EP_3@glass$, (b) crushed $EP_3@glass$ after heating at 85°C, (c) crushed PDMS₃@glass, (d) crushed PDMS₃@glass after heating at 85°C.