

Radiation polymerization for the preparation of universal coatings: remarkable anti-fogging and frost-resisting performance

Supporting information

Table S1. Elemental content obtained from EDS

elements	wt%	wt% Sigma
C	54.41	0.15
O	33.89	0.14
Na	4.88	0.04
S	6.82	0.04
Total amount	100.00	

Assuming the quality of the coated area scanned in EDS is 100M, according to EDS results, the mass of S is 6.82M, with a molar amount of 0.213Mmol; the mass of Na is 4.88M, with a molar amount of 0.212Mmol; the mass of O is 33.89M, with a molar amount of 1.059Mmol. The O in the coating comes from -COOH and -SO₃Na, as can be deduced from the molar amount of Na that the molar amount of SO₃⁻ is 0.212Mmol. Therefore, all remaining O comes from -COOH, yielding a molar amount of 0.212Mmol. Consequently, the molar ratio of AA and SAS in the EDS-scanned area is 1:1, while the weight ratio of AA and SAS in the feed is 2:1. As the molar mass of SAS is twice that of AA, their molar ratio is also 1:1, consistent with the result inferred through EDS scanning.



Figure S1. Pencil hardness tester for scratch hardness testing.



Figure S2. Peg knives for adhesion testing of adhesive tapes.



Figure S3. Scratch resistance test of coatings.

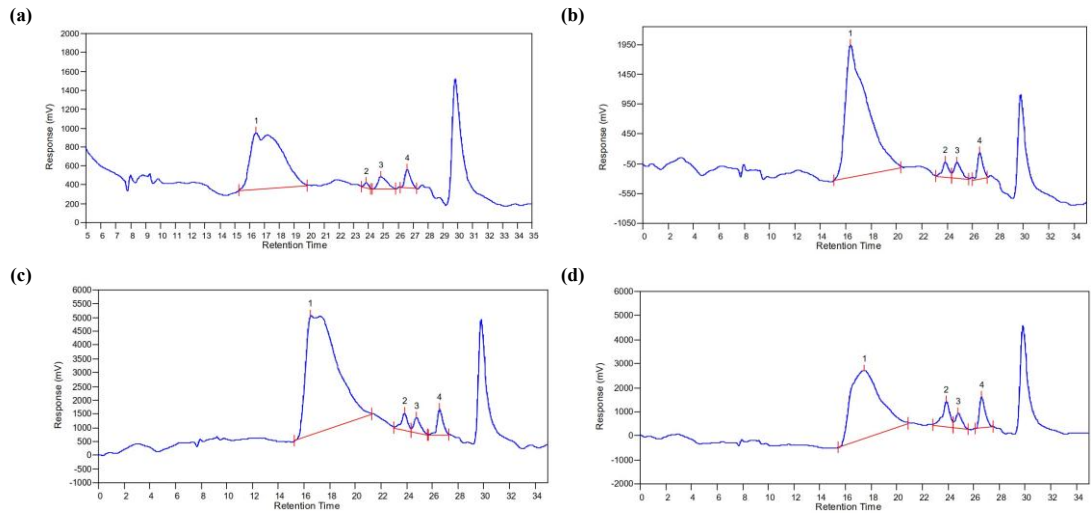


Figure S4. GPC curve of the AA_m/SAS_n : (a) AA_{10}/SAS_3 ; (b) AA_{10}/SAS_5 ; (c) AA_{10}/SAS_7 ; (d) AA_{10}/SAS_{10} .

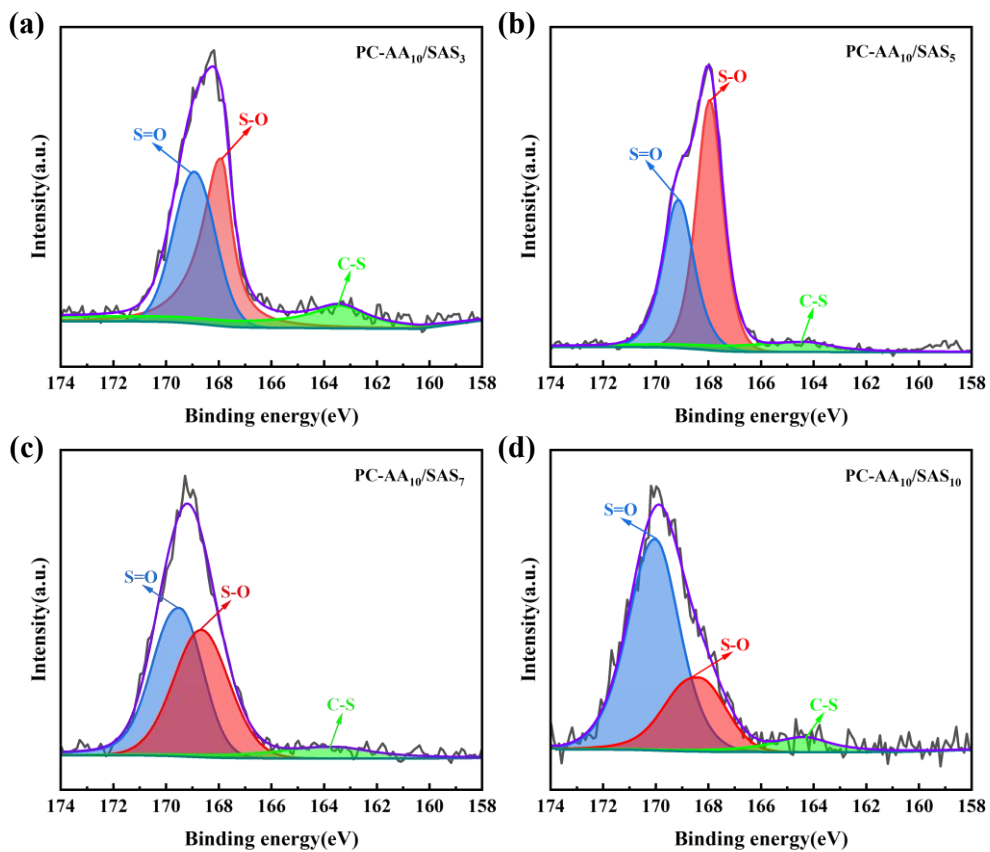


Figure S5. high-resolution XPS spectra of S2p: (a) PC- AA_{10}/SAS_3 ; (b) PC- AA_{10}/SAS_5 ; (c) PC- AA_{10}/SAS_7 ; (d) PC- AA_{10}/SAS_{10} .

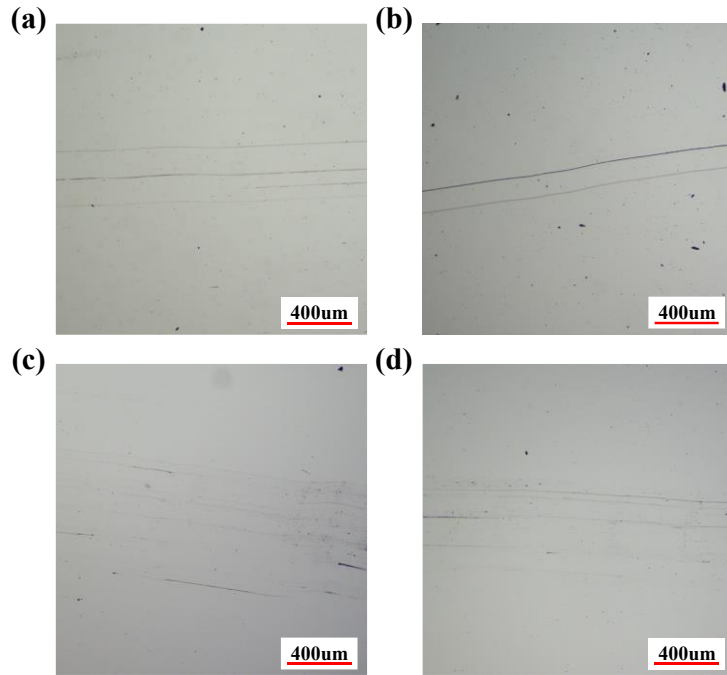


Figure S6. Optical photograph of pencil scratch hardness test: (a) PC-AA₁₀/SAS₃ (2B) ; (b) PC-AA₁₀/SAS₅ (HB) ; (c) PC-AA₁₀/SAS₇ (H) ; (d) PC-AA₁₀/SAS₁₀ (B).

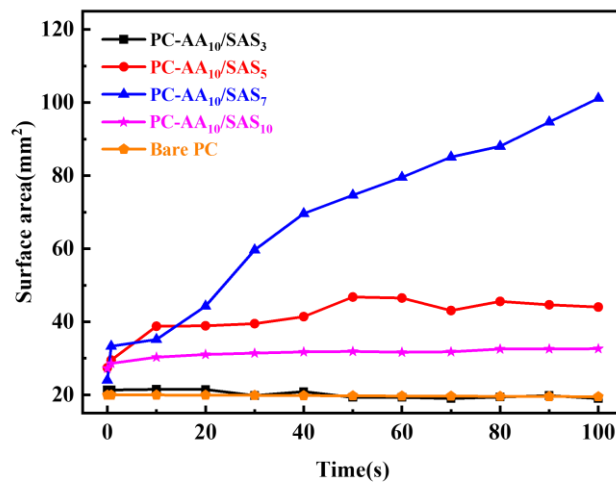


Figure S7. Change in surface area after spreading water droplets in 100s.

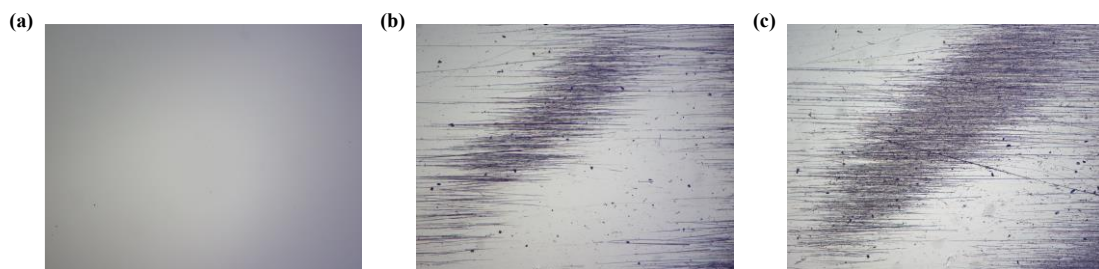


Figure S8. Optical microscope image after scratch test: (a) Initial state; (2) After ten

tests; (3) After fifteen tests.

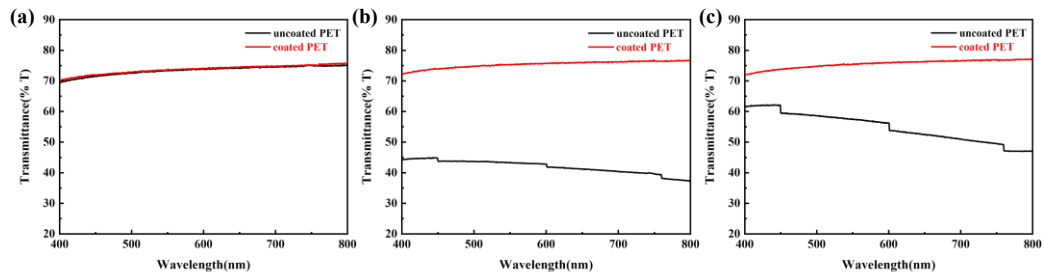


Figure S9. Transmittance of uncoated and coated PET with different test conditions: (a) at ambient condition (25°C, RH50%); (b) after conditioned at 80°C for 15s; (c) after conditioned at -25°C for 30 min.

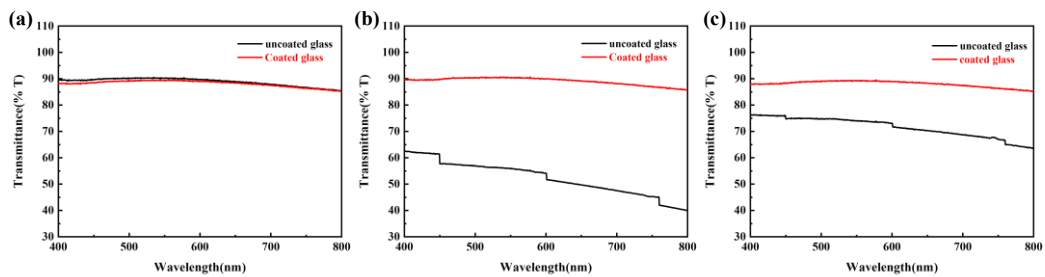


Figure S10. Transmittance of uncoated and coated glass with different test conditions: (a) at ambient condition (25°C, RH50%); (b) after conditioned at 80°C for 15s; (c) after conditioned at -25°C for 30min.

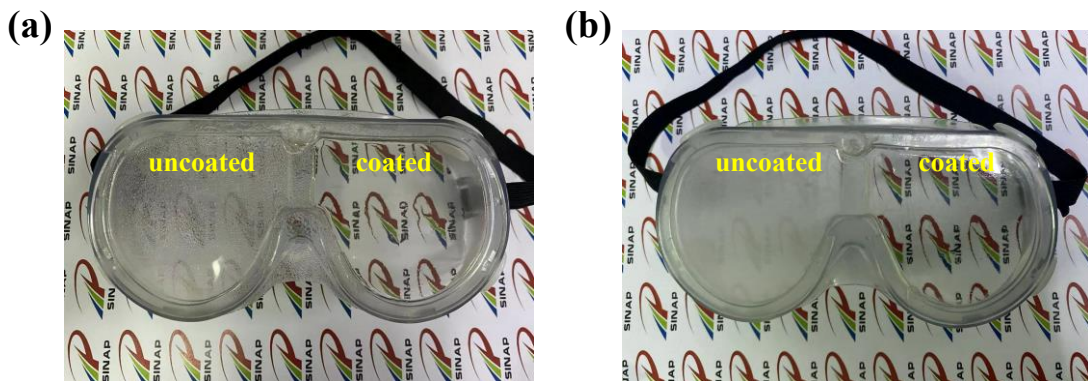


Figure S11. Anti-fogging and frost-resisting test images after one year: (a) Anti-fogging test; (b) Frost-resisting test.