# Supporting Information

## Rational Design and Easy Fabrication of Transparent Photothermal/hygroscopic Composite Coatings with Long-lasting Antifogging Performance under Sunlight Activation

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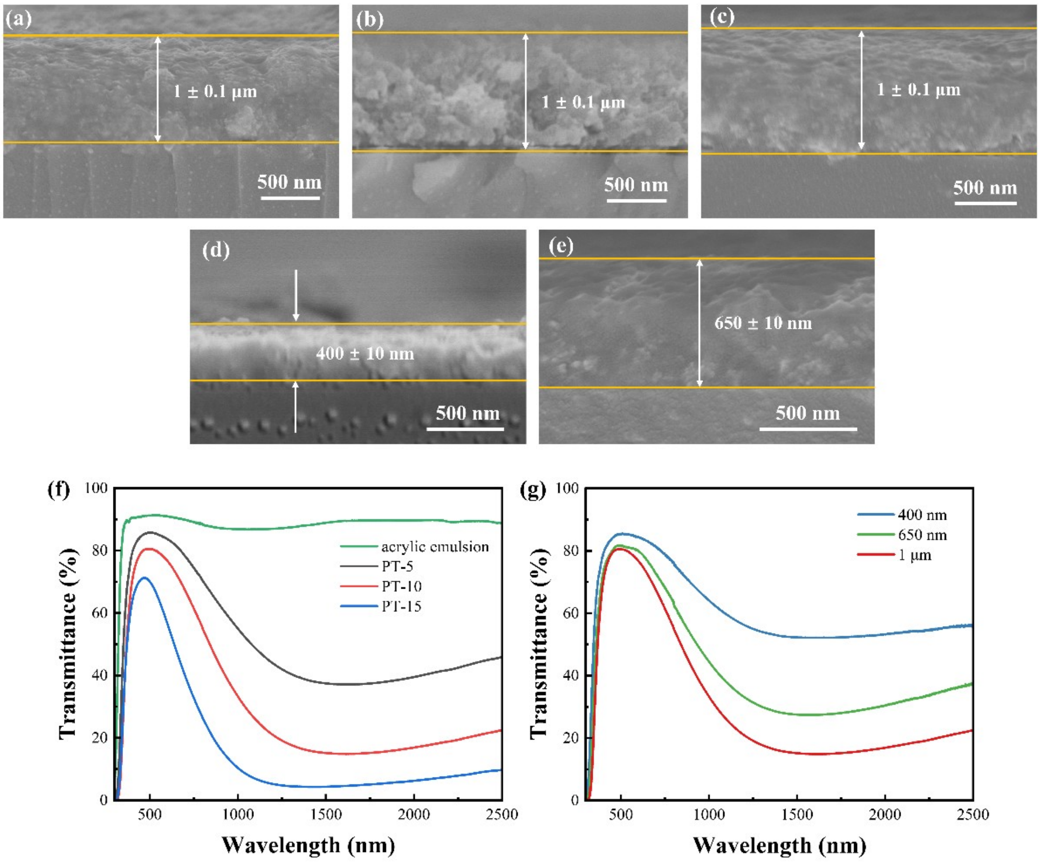


**Figure S1** Cross-section SEM images of PT-5 (a), PT-10 (b) and PT-15 (c) and coatings with a $Cs_xWO_3$ mass fraction of 10 wt% but varied thicknesses (d, e). Transmission spectra of PT layers (f) with varied mass fractions of $Cs_xWO_3$ nanoparticles but the same thickness of ca. 1 μm and (g) with varied thicknesses.

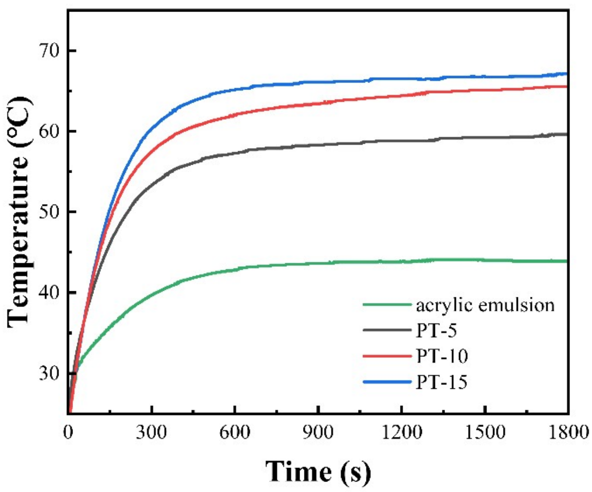


**Figure S2** Temperature response of PT layers with varied mass fractions of $Cs_xWO_3$ nanoparticles but the same thickness of ca. 1 μm under 1-sun illumination.

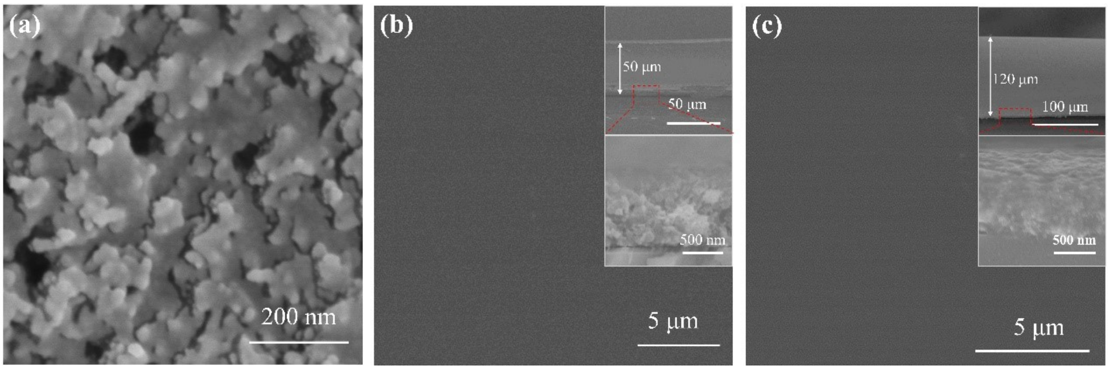


**Figure S3** SEM images of (a) the PT layer surface, (b, c) the PTH composite coating surfaces with different thicknesses, insets are cross-section SEM images.

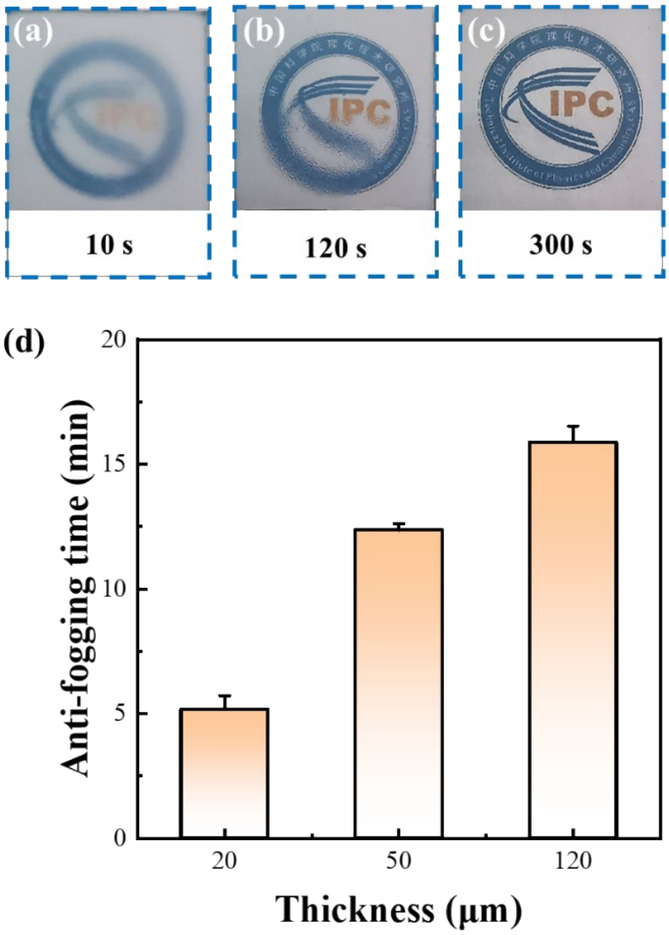


**Figure S4** (a-c) Digital photos of PT layer over time during hot steam antifogging test. (d) Antifogging duration of H layers with varied thicknesses.

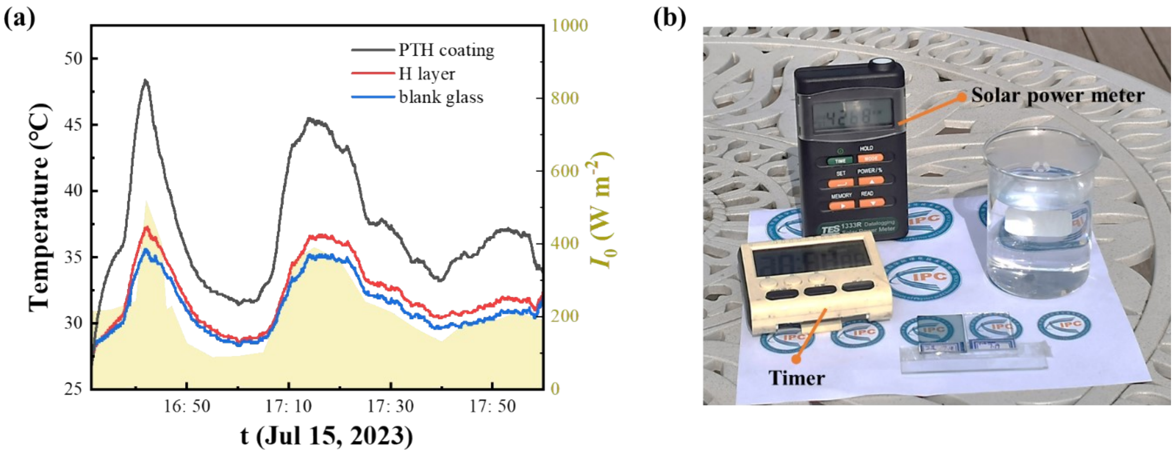


**Figure S5** (a) Temperature variation of PTH coating outdoors during a cloudy dusk ($T_{amb}$≈31.2℃, RH≈ 33%). (b) Schematic diagram of the setup for outdoor antifogging tests.

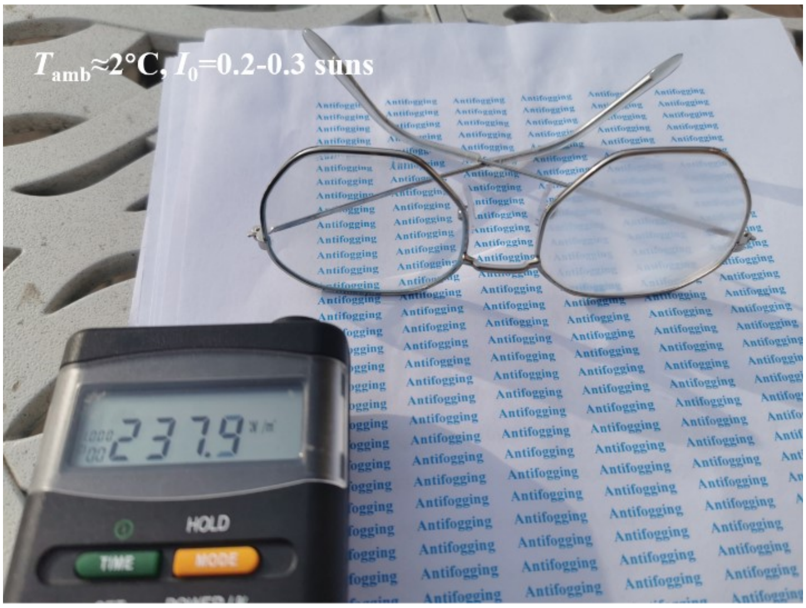


**Figure S6** Comparison of antifogging performance of coated and uncoated eyeglass lenses.

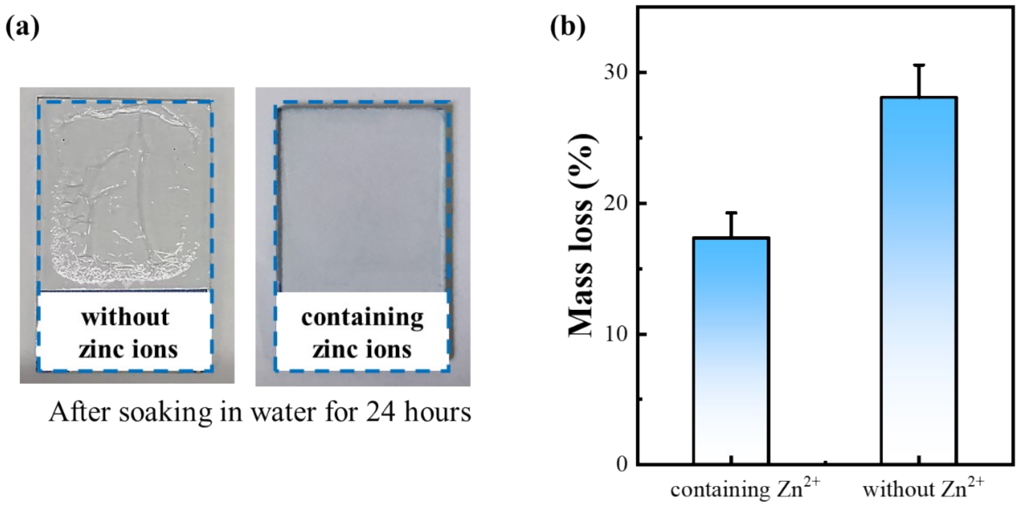


**Figure S7** (a) Appearance and (b) percentage mass loss of coatings after soaking in water for 24 h, whose H layer was coated with and without zinc ions on the same bottom PT layer.

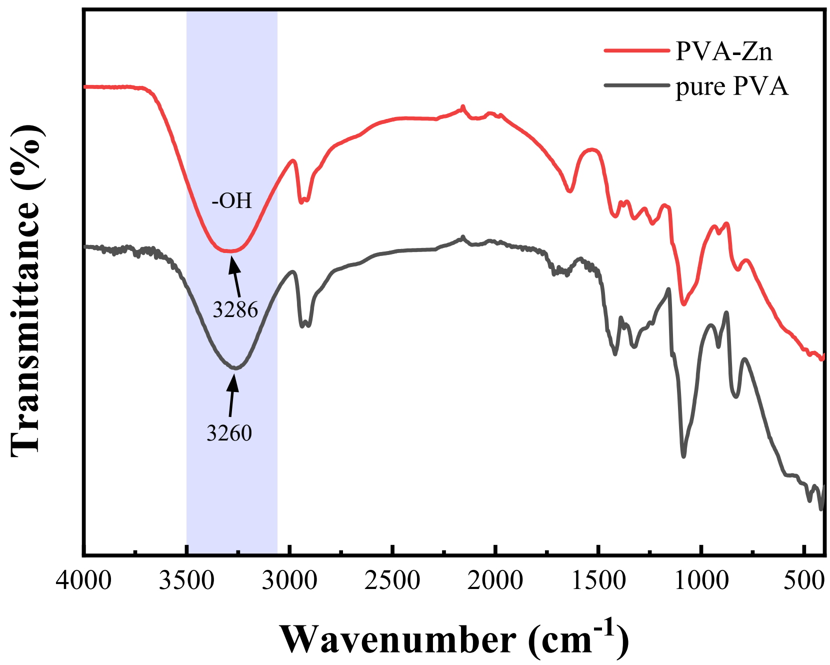


**Figure S8** ATR-FTIR spectra of the H layers with and without zinc ions.