Supporting Information

Fully sustainably sourced and closed-loop recyclable underwater adhesive for on-demand erasable electronic sealing

Xingle Chen[a], Zexuan Wang[a], Mingsong Huang[a], Qin Zhang[b], and Xin Liu[a]*

[a] Polymeric and Soft Materials Laboratory, School of Chemical Engineering and Advanced Institute of Materials Science, Changchun University of Technology, Changchun 130012, China.

[b] Polymeric and Soft Materials Laboratory, School of Chemistry and Life Science and Advanced Institute of Materials Science, Changchun University of Technology, Changchun 130012, China.

Corresponding author: Xin Liu

E-mail: liuxin@ccut.edu.cn

Supplementary Figures

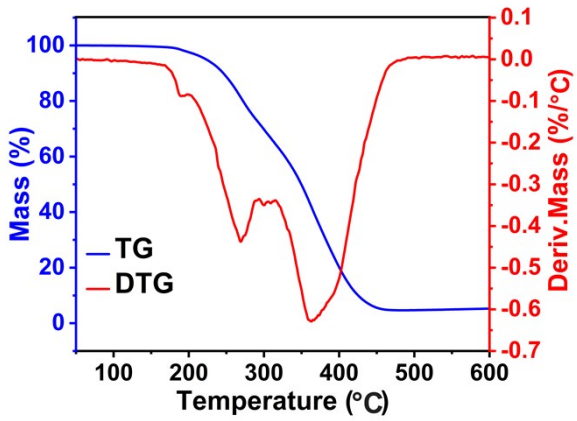

Figure S1. TG and DTG curves of the PTAE adhesive.

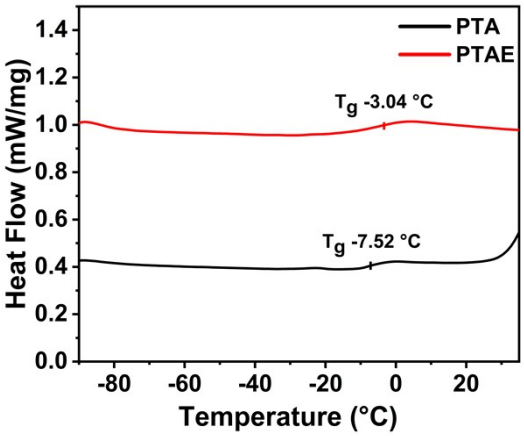

Figure S2. DSC curves of PTA and PTAE.

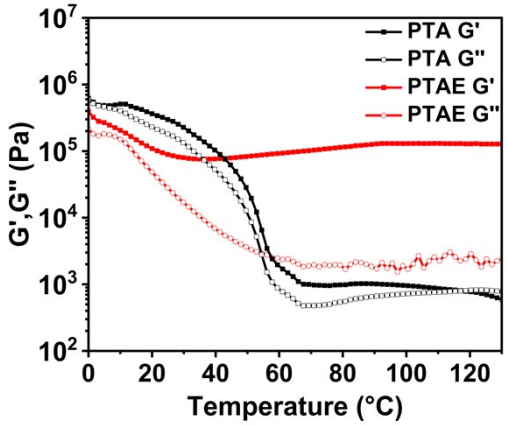

Figure S3. Temperature-dependent rheology of PTA and PTAE.

Figure S4. The failure mode of the adhesive lap joint of PTAE.

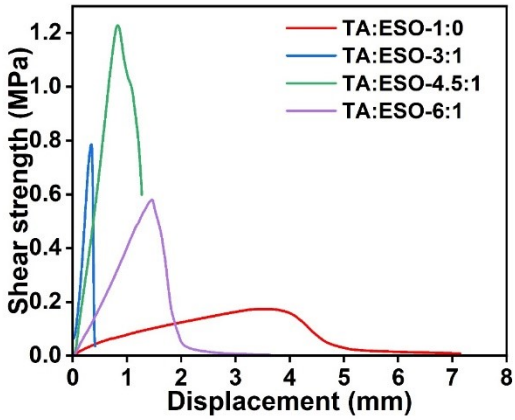

Figure S5. The shear adhesion strength of the PTAE adhesive with different ratios of ESO to TA.

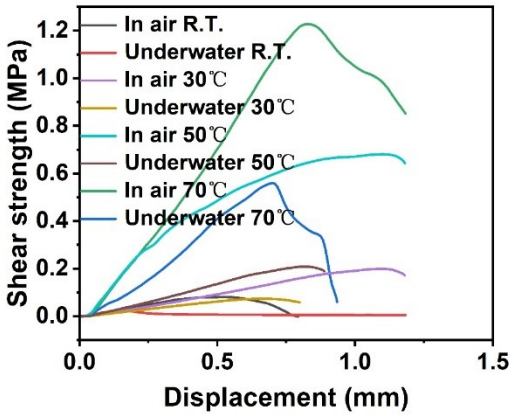

Figure S6. The shear adhesion strength of the PTAE adhesive with different curing temperatures.

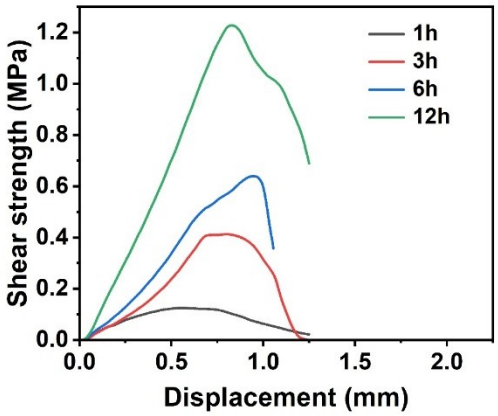

Figure S7. The shear adhesion strength of the PTAE adhesive with different curing times.

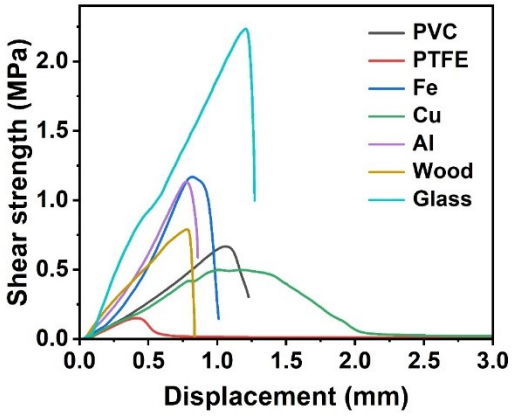

Figure S8. The adhesive strength of PTAE to different substrates after being placed for 3 days.

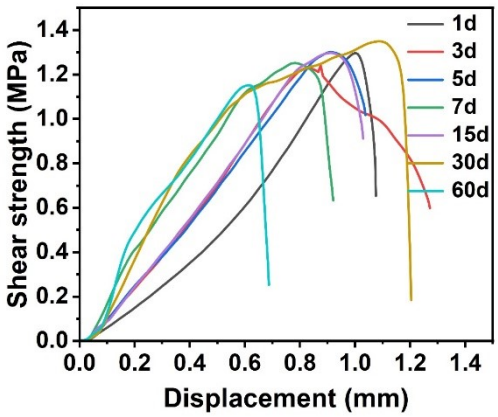

Figure S9. Adhesive strength of PTAE in air for 60 days.

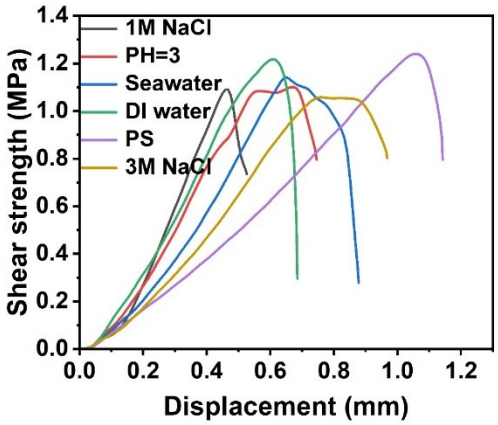

Figure S10. The adhesive strength of PTAE was evaluated in different aqueous solutions after 10-day immersion.

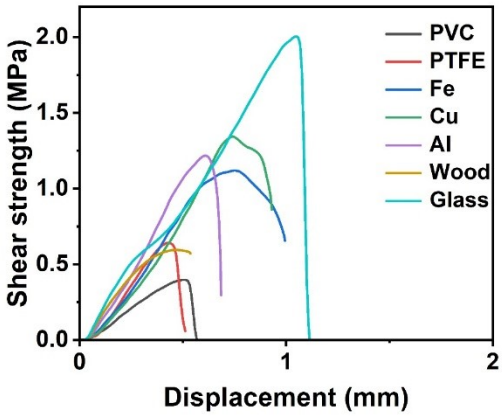

Figure S11. PTAE was tested for adhesion to various substrates after 10 days of immersion.

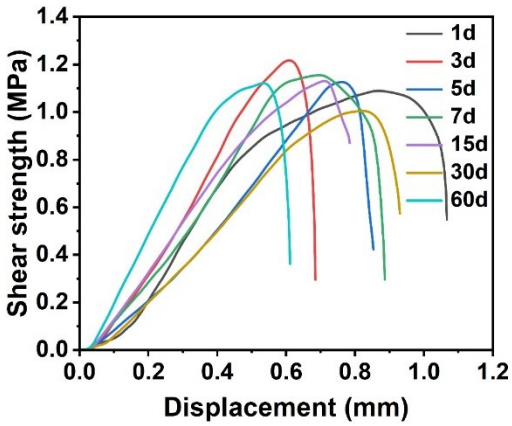

Figure S12. The adhesive strength of PTAE was measured before and after immersion in water for 60 days.

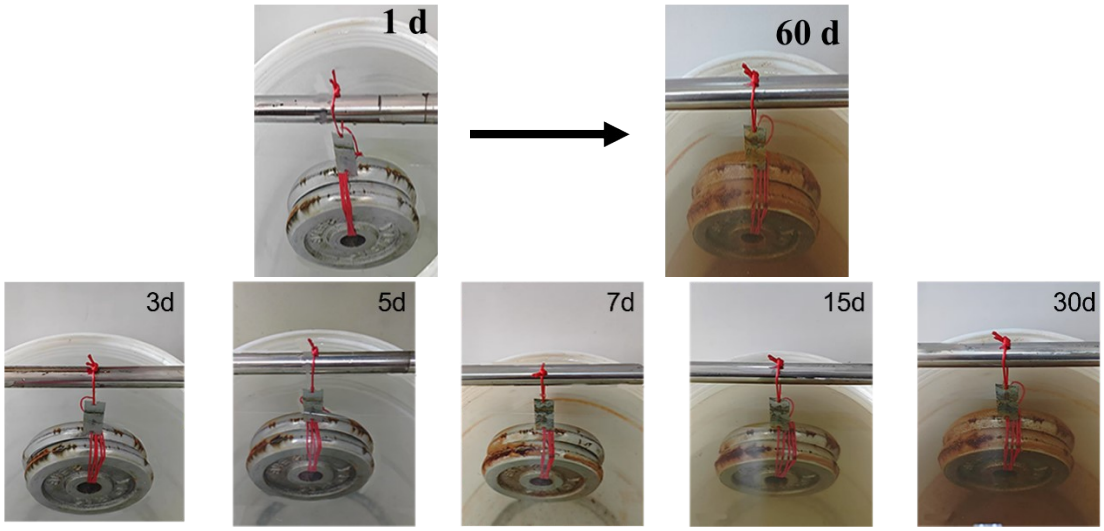

Figure S13. During the 60-day immersion, iron samples bonded with PTAE supported a 5 kg weight without failure.

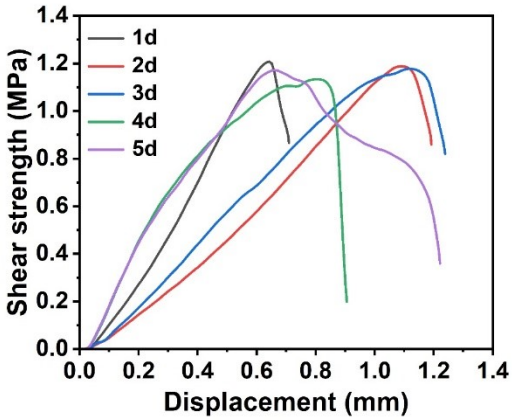

Figure S14. The adhesive strength of PTAE was measured under constant temperature (45 °C) and humidity (75% RH).

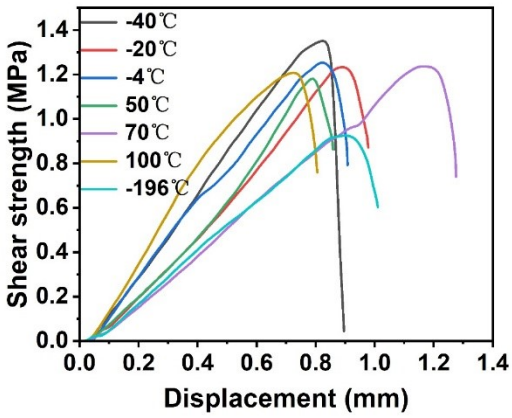

Figure S15. PTAE was exposed to temperatures ranging from -40 °C to 100 °C for 24 h and -196 °C (liquid nitrogen) for 5 min, after which its adhesive strength was measured.

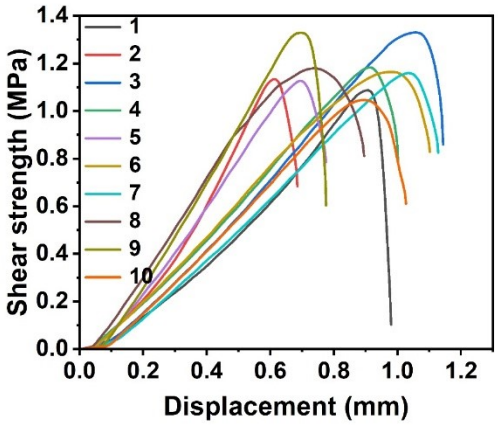

Figure S16. PTAE was subjected to 10 thermal cycles, each consisting of 3 h at -20 °C followed by 3 h at 100 °C.

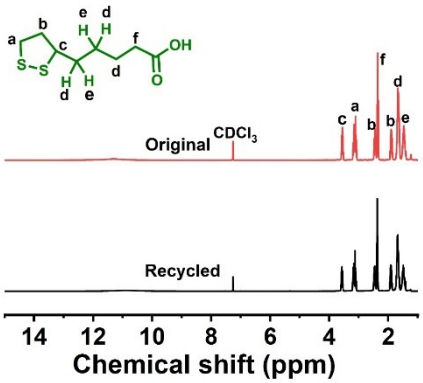

Figure S17.1H NMR spectra of the original TA and recycled TA.

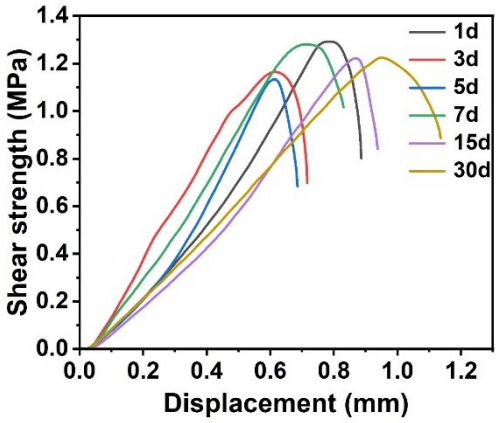

Figure S18. Long-term stability of PTAE adhesive after recycling.

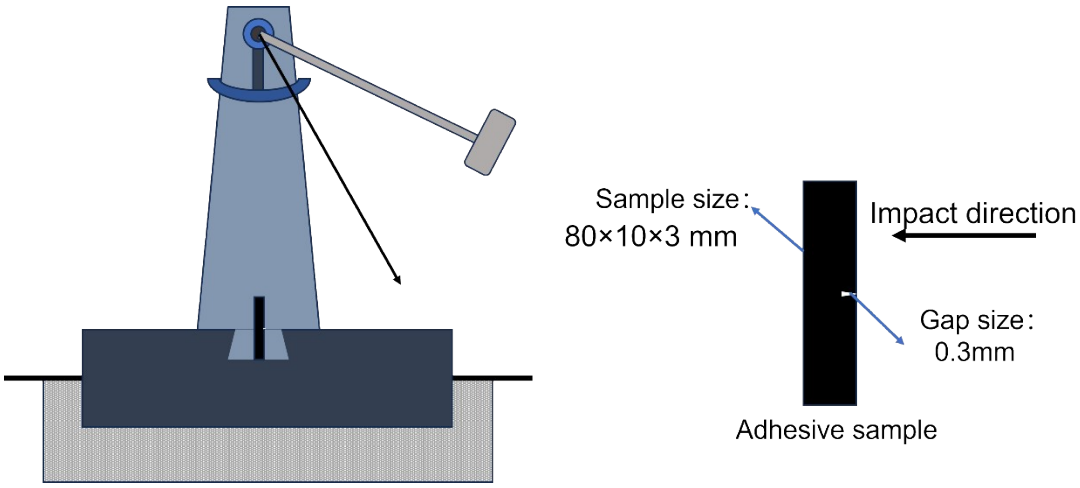

Figure S19. Schematic diagram of the cantilever beam impact testing machine.

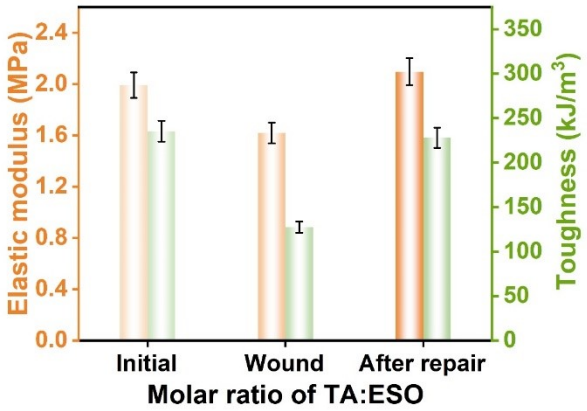

Figure S20. Toughness and elastic modulus of the initial material before and after repair.