Electronic Supplementary Material (ESI) for Materials Advances.

Supporting information

Reversible and Fast Responsive Humidity Sensor Based on Lead-Free Cs_2TeCl_6 Double Perovskite

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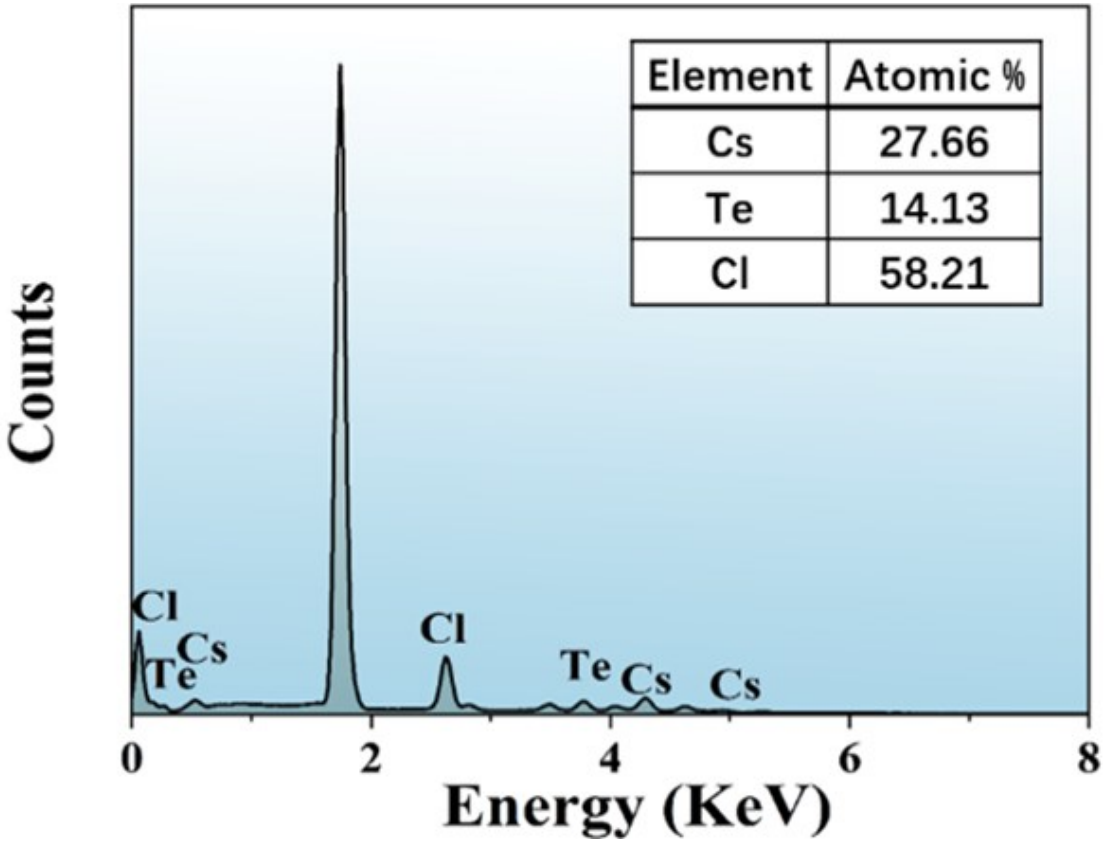

Figure S1. EDX spectroscopy of Cs_2TeCl_6, the inset is the average atomic ratio Cs/Te/Cl of 2:1:6 determined by EDS.

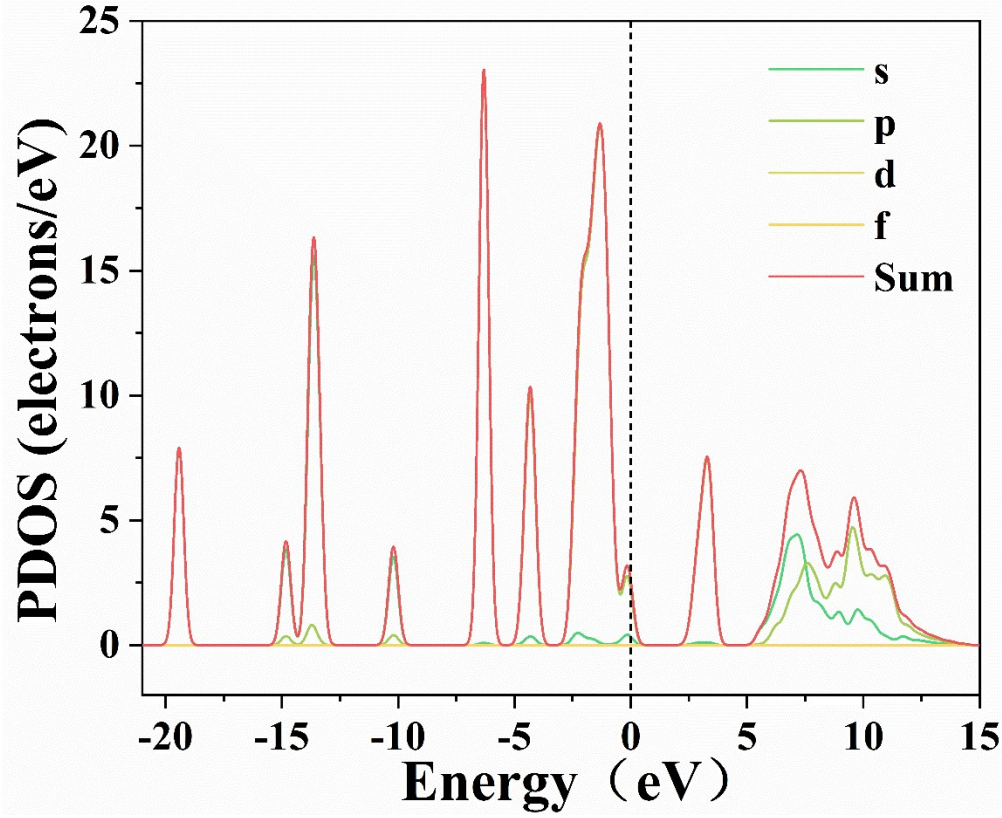

Figure S2. The partial density of states (PDOS) of Cs_2TeCl_6, the dotted line refers to the Fermi level (0 eV).

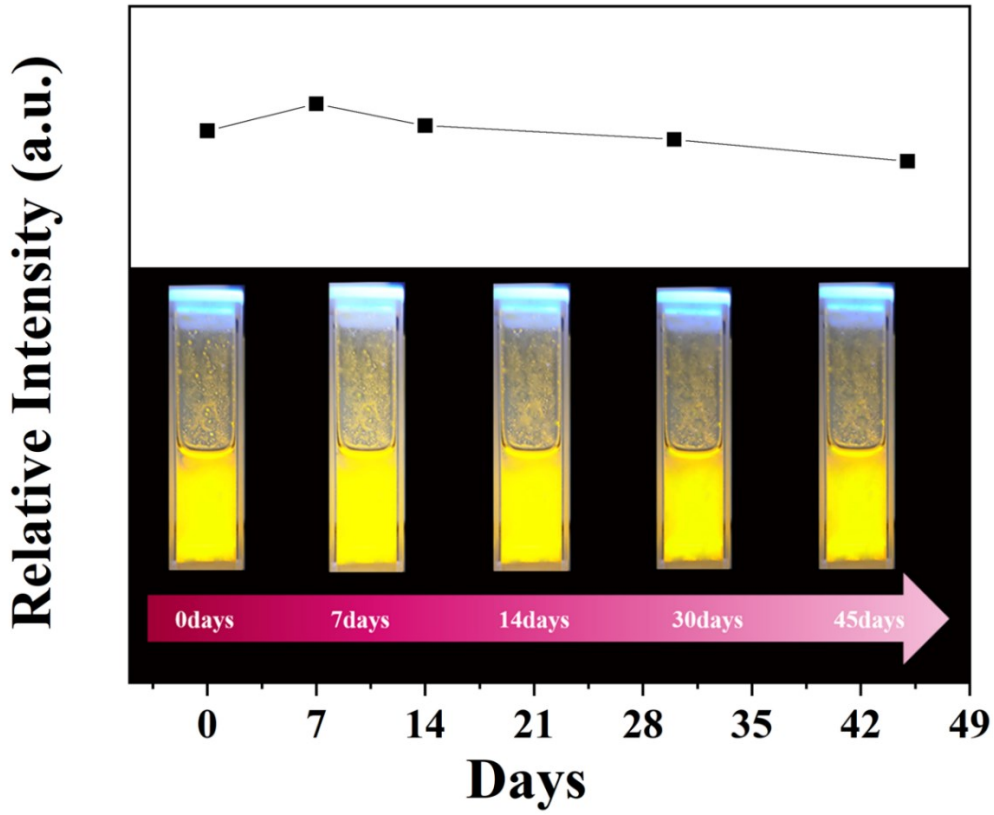

Figure S3. The luminescence intensity of the sample stored in the air under excitation at 365 nm, the inset is the physical luminescence of Cs_2TeCl_6.

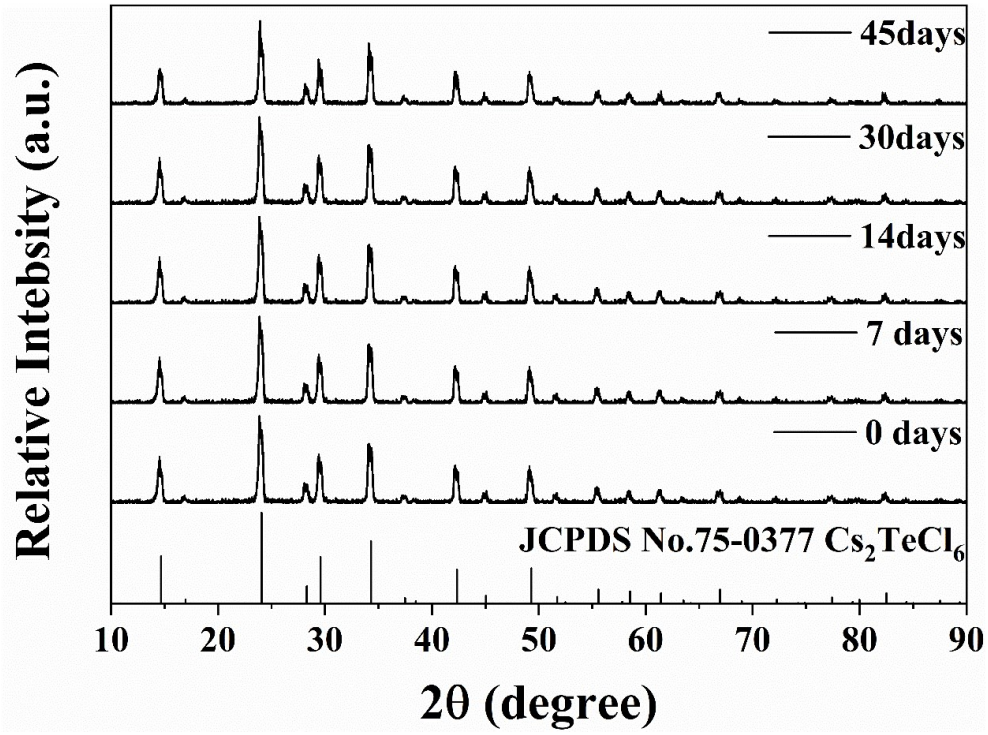

Figure S4. The XRD patterns of Cs_2TeCl_6 stored in air for 45 days.

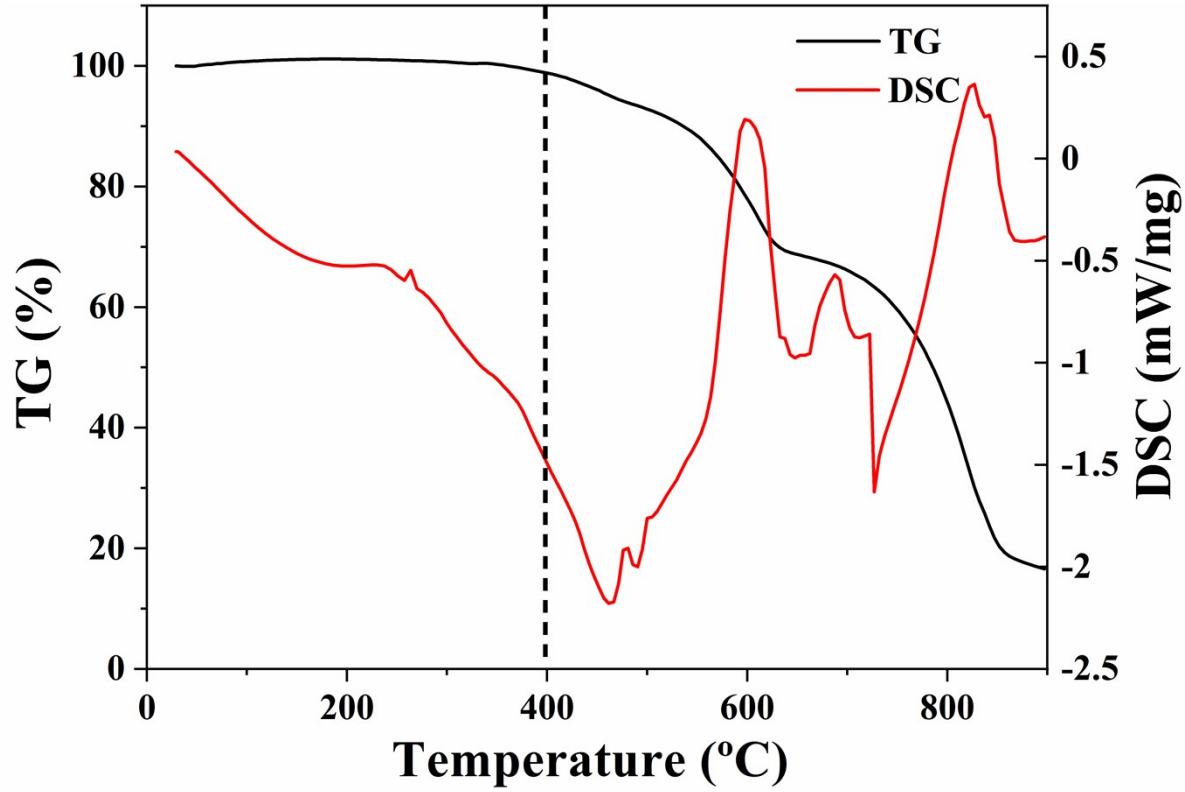

Figure S5. TG and DSC of Cs_2TeCl_6.

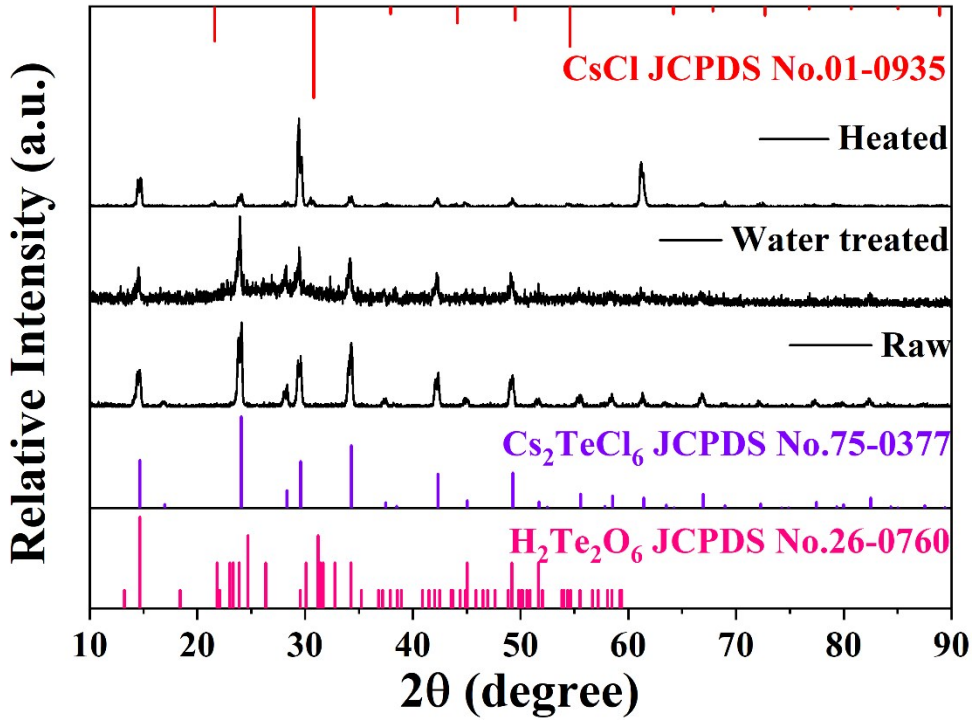

Figure S6. The XRD patterns of Cs_2TeCl_6 before and after the thermal repair.

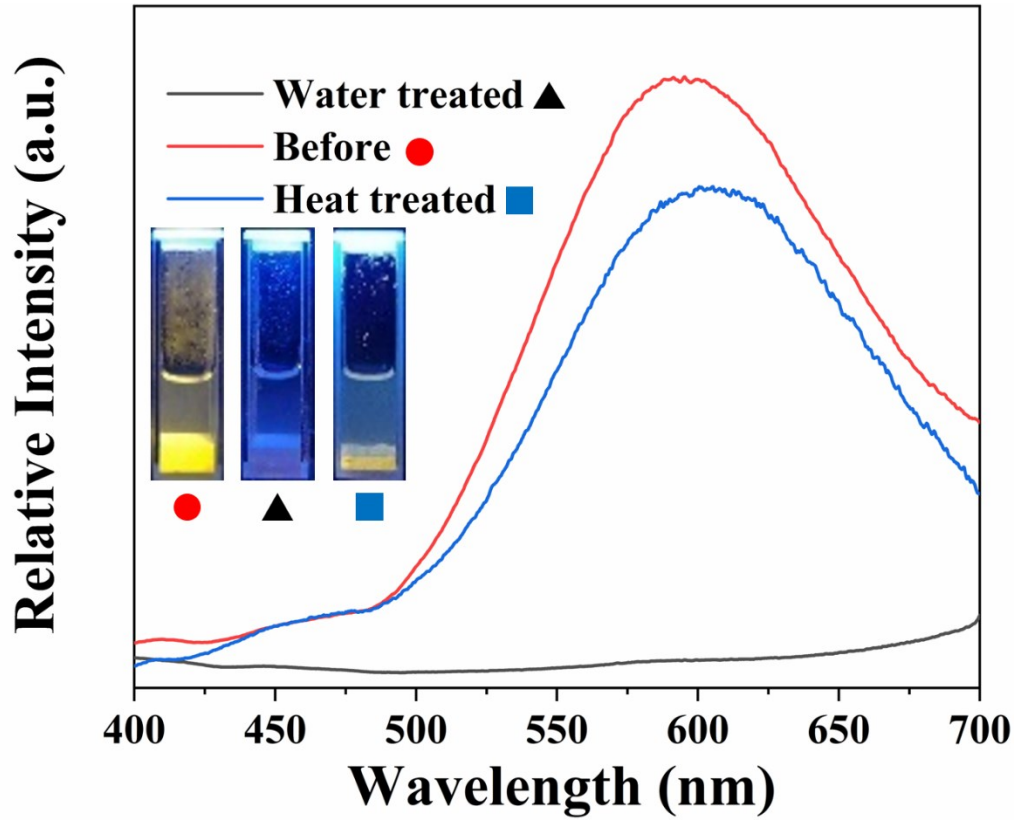

Figure S7. PL spectra of Cs_2TeCl_6 before and after the thermal repair under 365nm excitation, insets are physical luminescence diagrams, where triangle, circle, and square represent water-treated, original, and heat-treated samples, respectively.

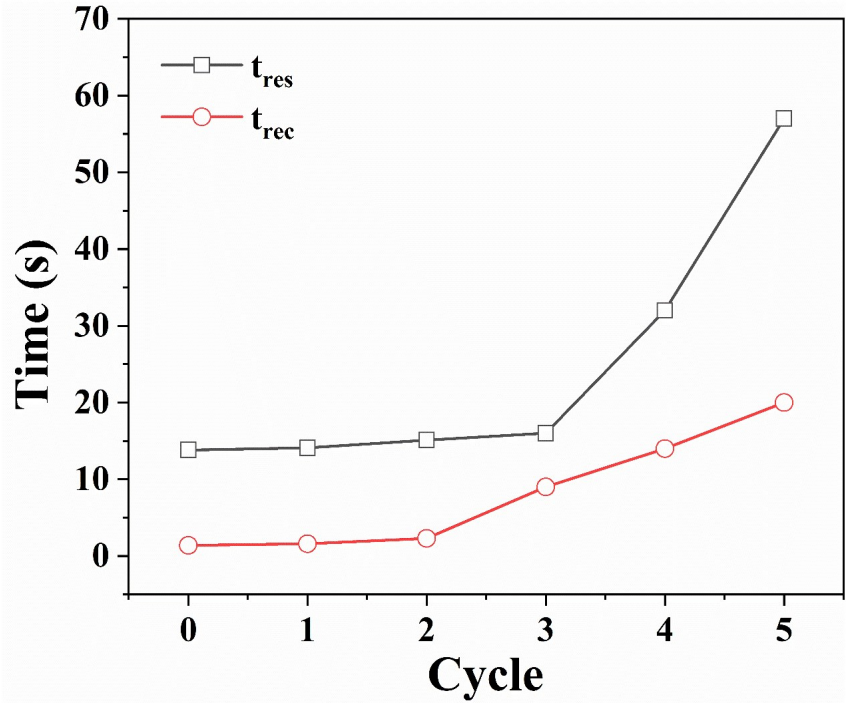

Figure S8. The response and recovery time of the humidity sensitive detector under multiple cycles of heat treatment.

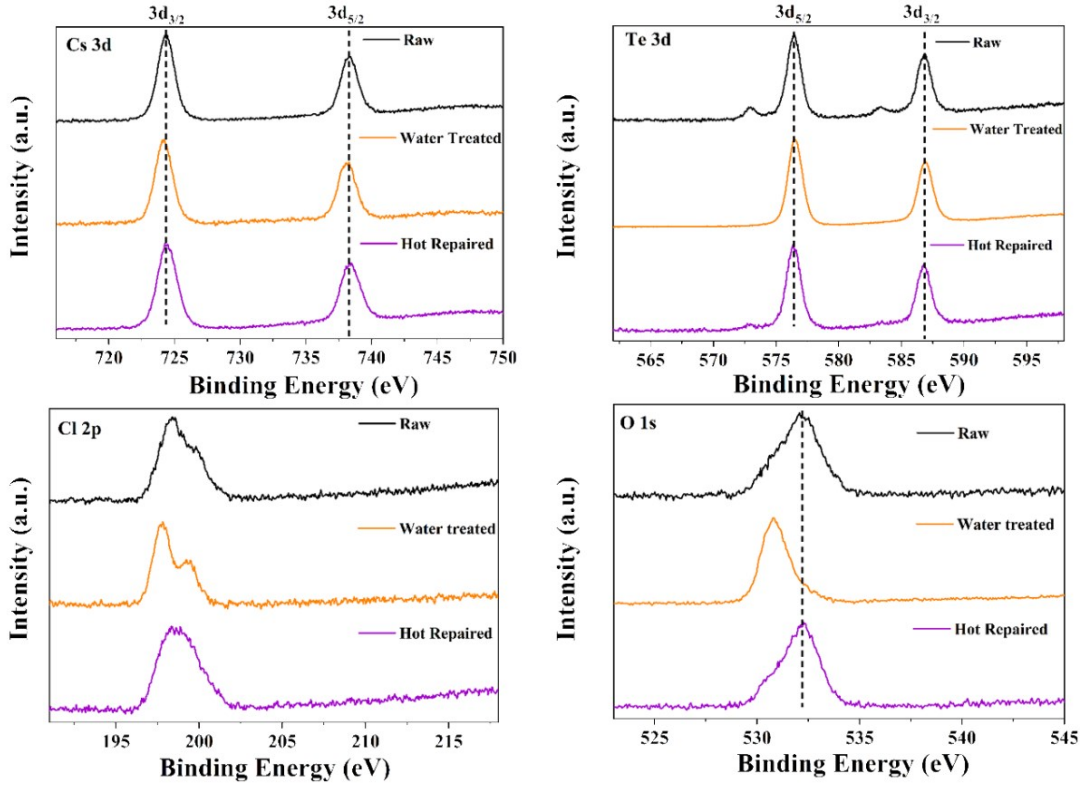

Figure S9. XPS spectra of (a) Cs 3d, (b) Te 3d, (c) Cl 2p, (d) O 1s for Cs_2TeCl_6 before and after heat treatment.

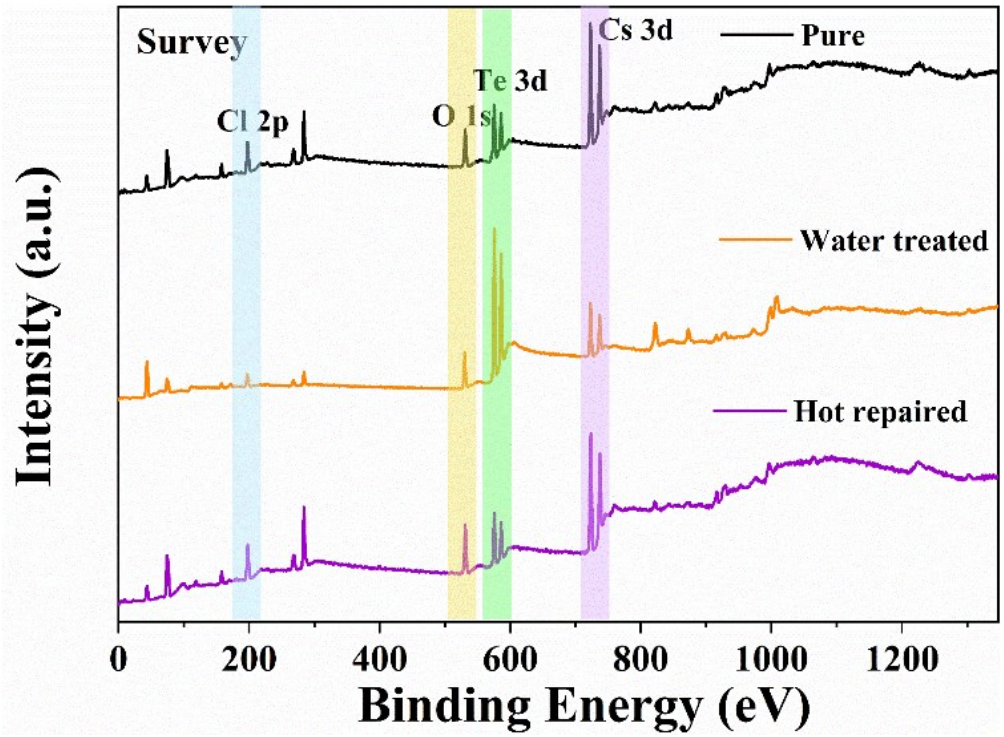

Figure S10. XPS survey scan spectra of Cs_2TeCl_6 before and after heat treatment.

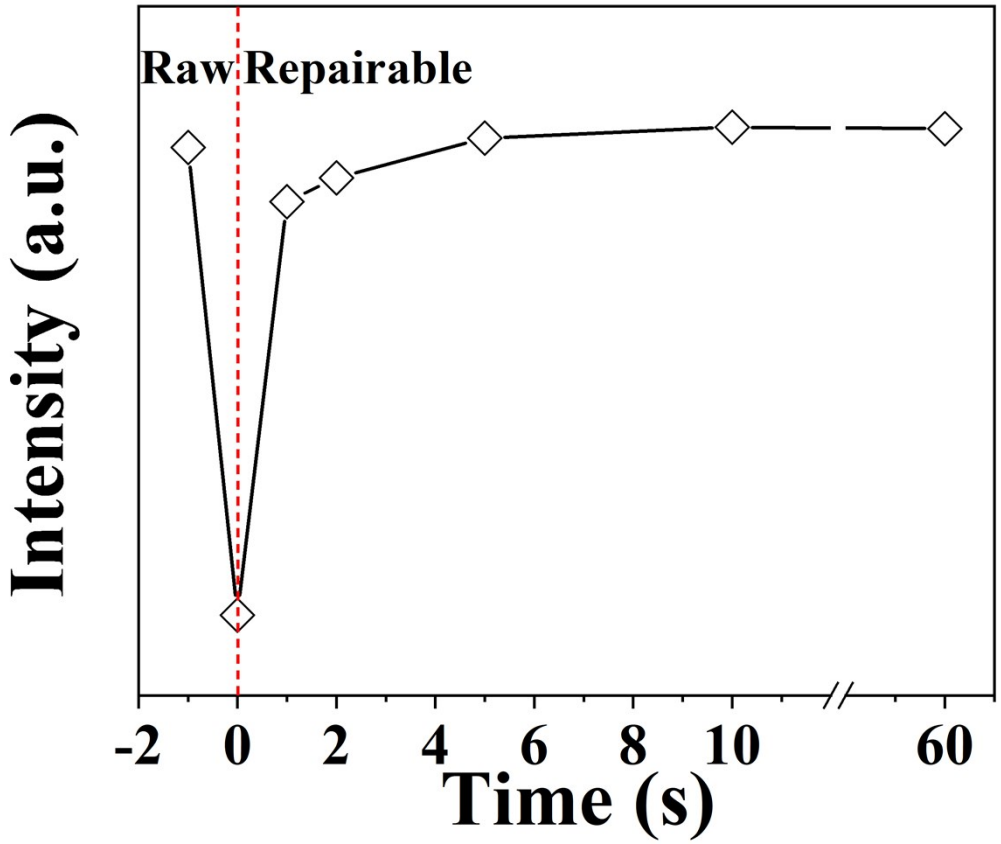

Figure S11. The time-dependent luminescence intensity of the sample under 365nm excitation for HCl gas treatment.

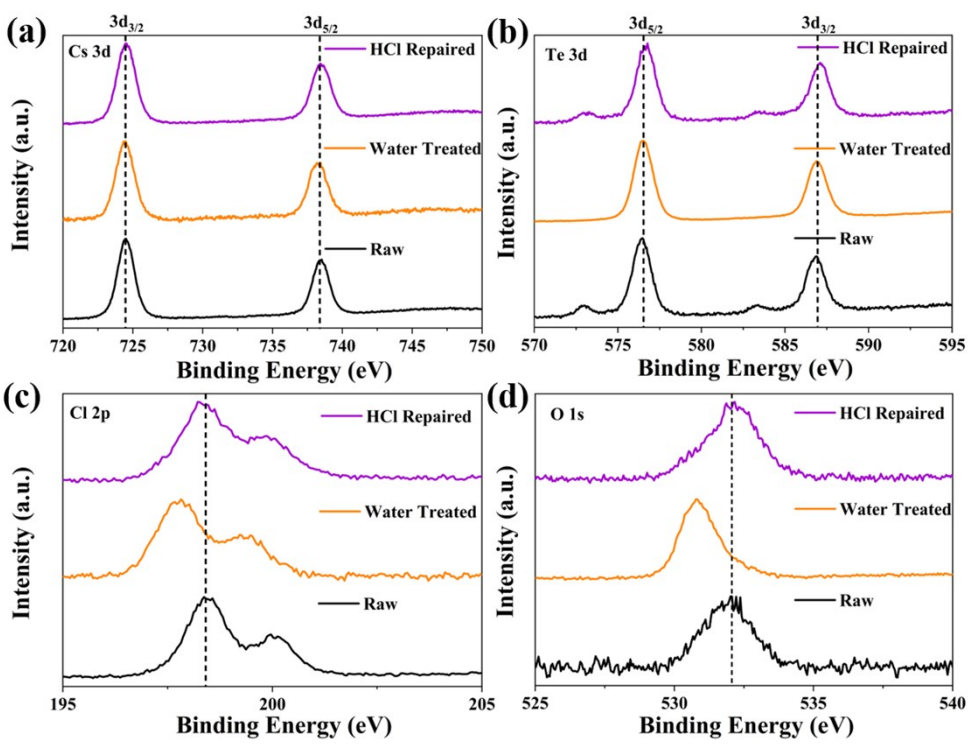

Figure S12. XPS spectra of (a) Cs 3d, (b) Te 3d, (c) Cl 2p, (d) O 1s for Cs_2TeCl_6 before and after HCl gas repairment.

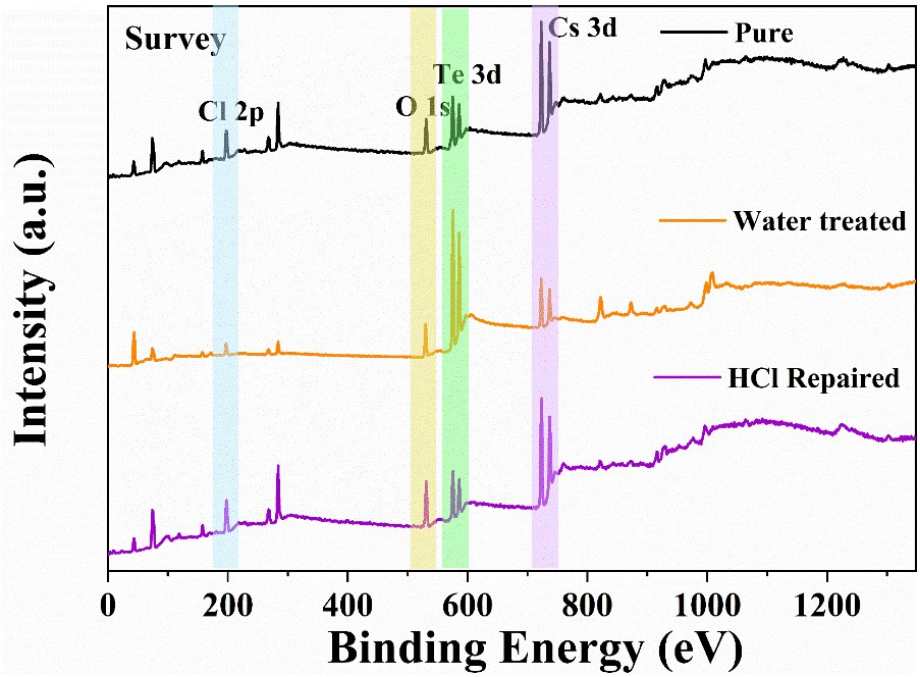

Figure S13. XPS survey scan spectra of Cs_2TeCl_6 before and after HCl gas repairment.