Achieving near-unity quantum yield of yellow emitting metal halide double perovskites toward human-centric warm white LED lightings

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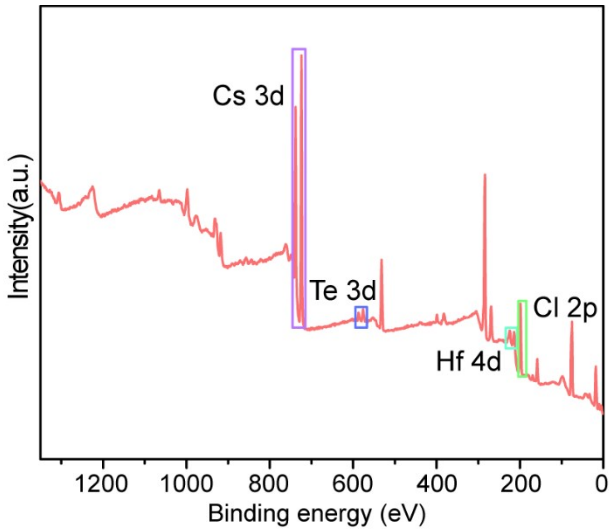

Figure. S1. XPS survey spectrum of sample Cs_2HfCl_6: Te.

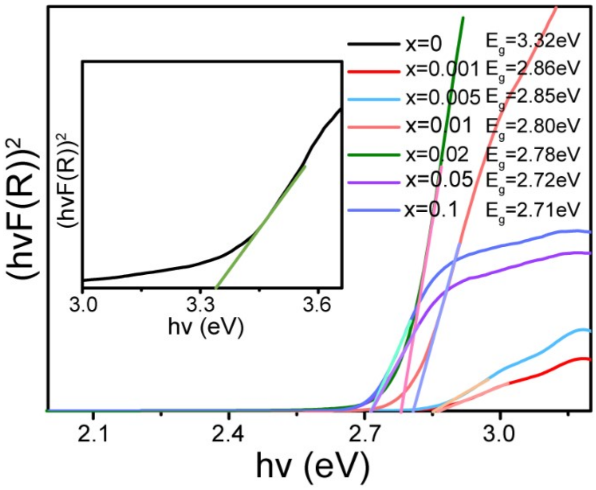

Figure S2. the function of $(h\nu F(R))^2$ versus hν.

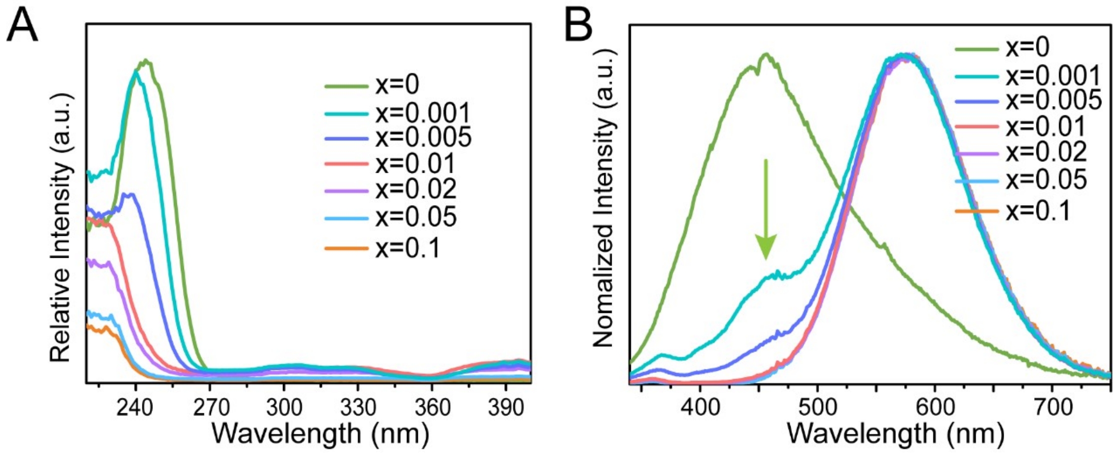

Figure S3. (A) Excitation (λ_{em}=456 nm) and **(B)** emission (λ_{ex}=254 nm) spectra of Cs_2HfCl_6: Te.

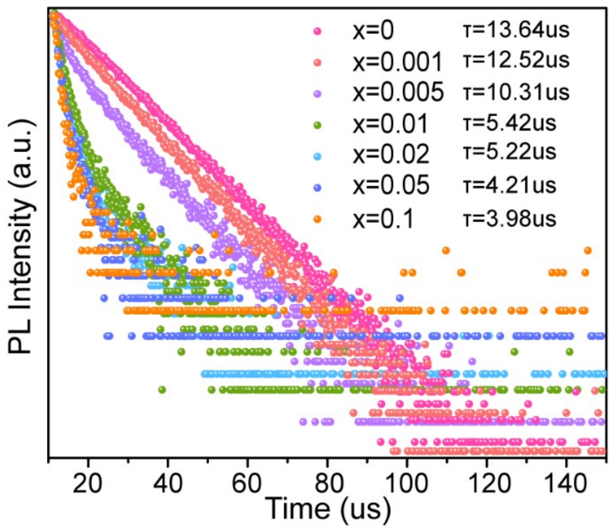

Figure S4. Decay curves of Cs_2HfCl_6: Te (λ_{ex}=254 nm, λ_{em}=456 nm).

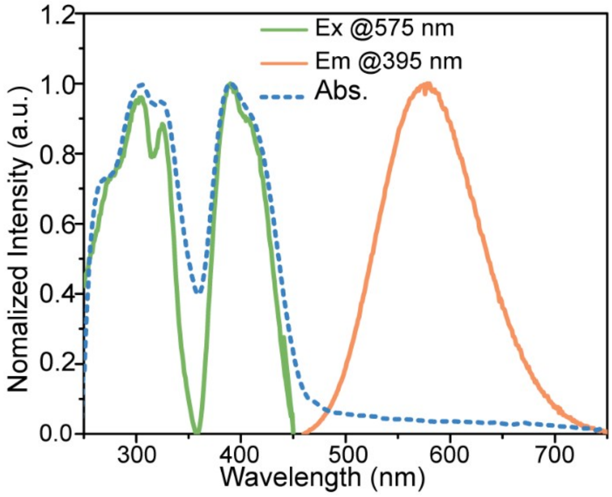

Figure S5. Normalized absorption, excitation and emission spectra of CHC.

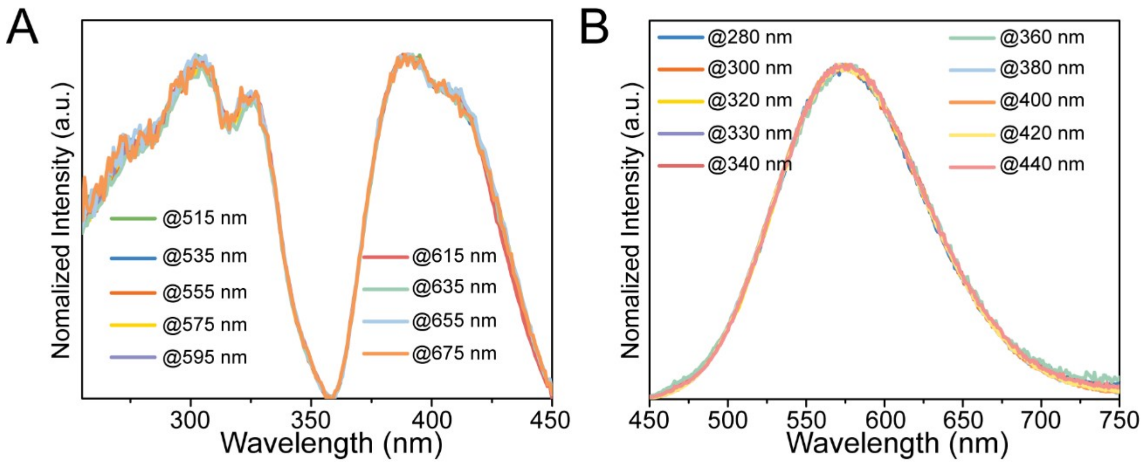

Figure S6. A) Normalized excitation spectra monitored at different emission wavelengths. **B)** Normalized emission spectra upon different excitation wavelengths.

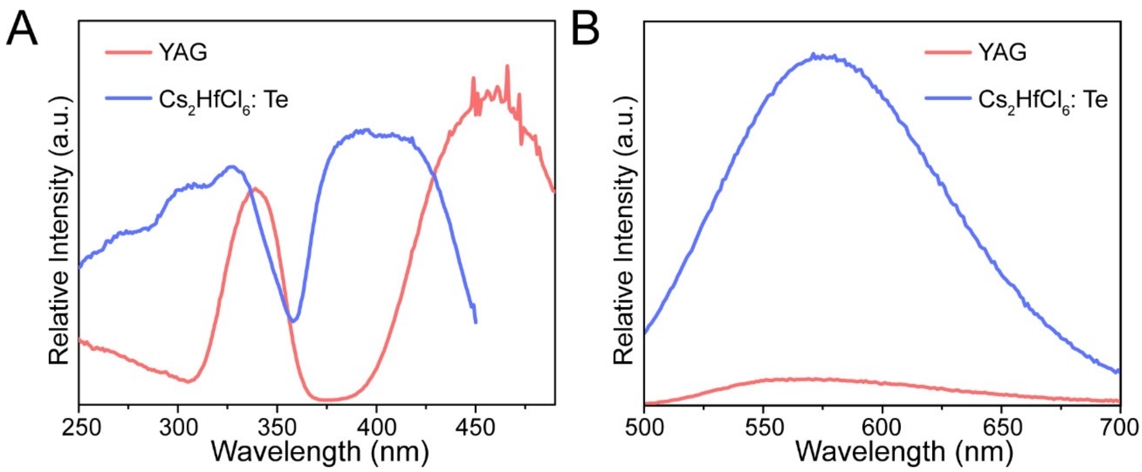

Figure S7. A) Excitation spectra of the commercial phosphors YAG and the as-prepared Cs_2HfCl_6: Te yellow phosphors monitored at 575 nm. **B)** Emission spectra of the commercial phosphors YAG and the as-prepared Cs_2HfCl_6: Te yellow phosphors upon 395 nm.

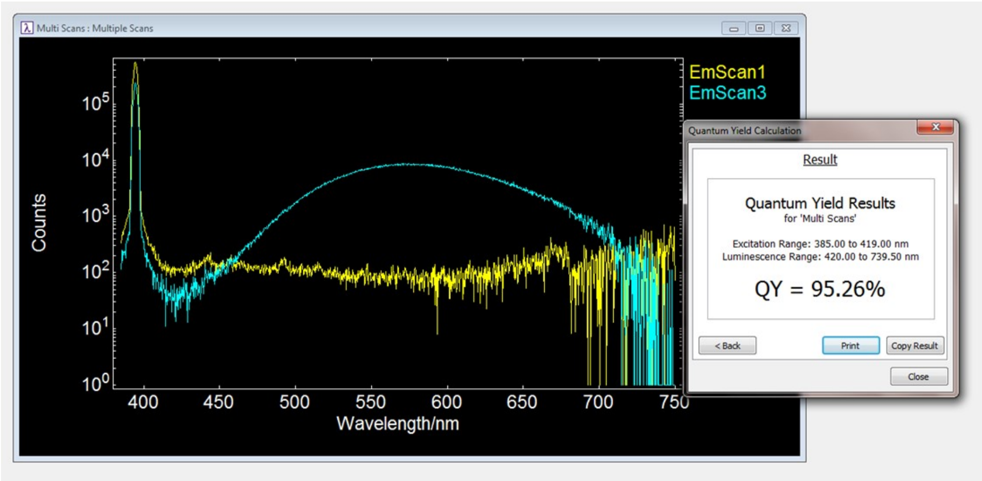

Figure S8. The PLQY of Cs_2HfCl_6: 0.5%Te.

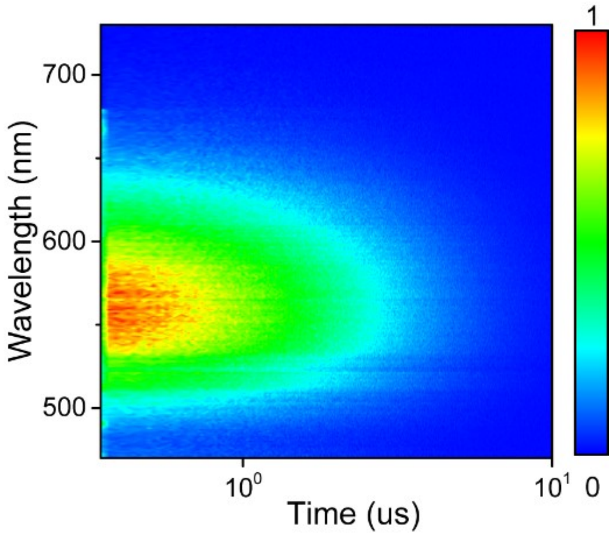

Figure S9. Pseudocolor map of Cs_2HfCl_6: Te nanosecond transient emission spectra excited by 395 nm.

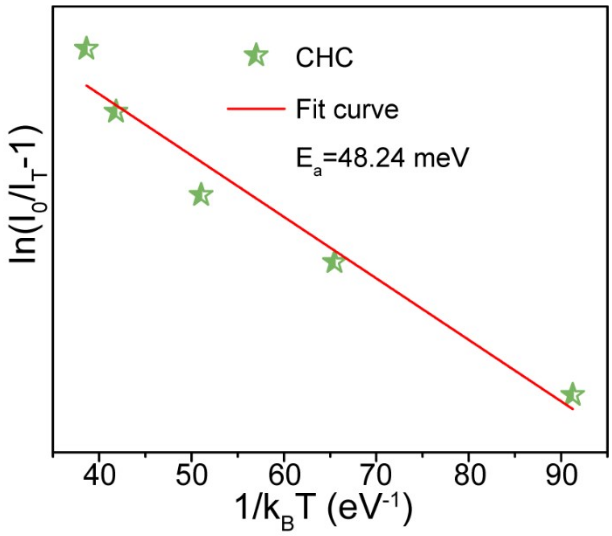

Figure S10. The relationships between $\ln(I_0/I_T-1)$ versus $1/k_BT$ (T=77–300 K) and the linear fitting result.

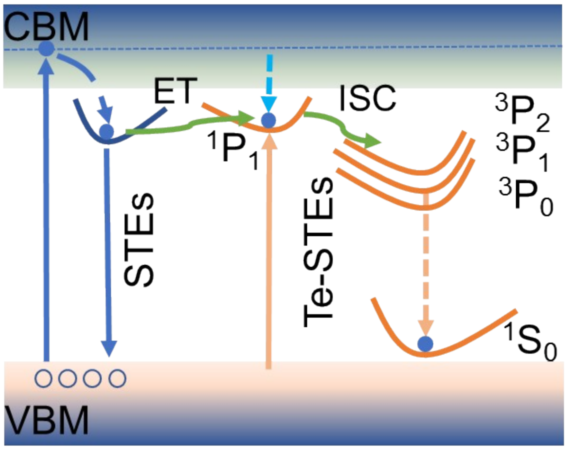

Figure S11. Energy level diagram for the photoluminescence process.

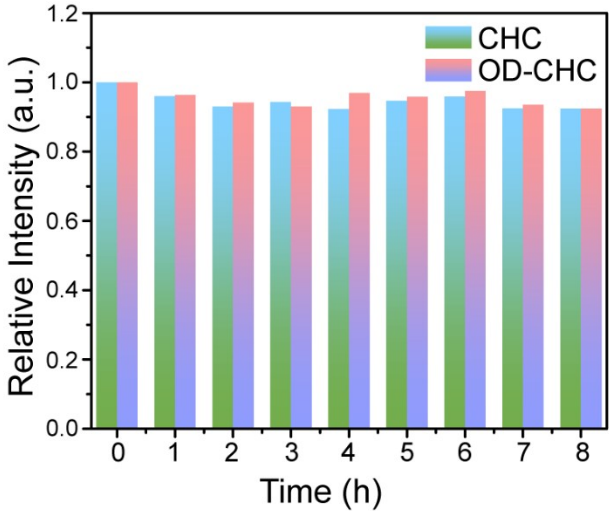

Figure S12. The normalized PL intensity between CHC and OD-CHC with UV (254nm, 36W) irradiation in ambient atmosphere at room temperature for different times.