Supporting Information

Prolonging the Lifetime of Quasi-2D Perovskite Blue LEDs via DMAcPA Doping for Defect Passivation

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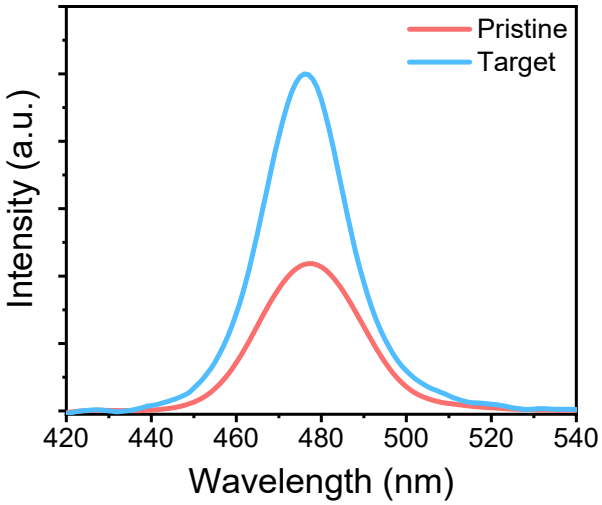

Figure S1. PL spectra of perovskite thin films with and without DMAcPA modified.

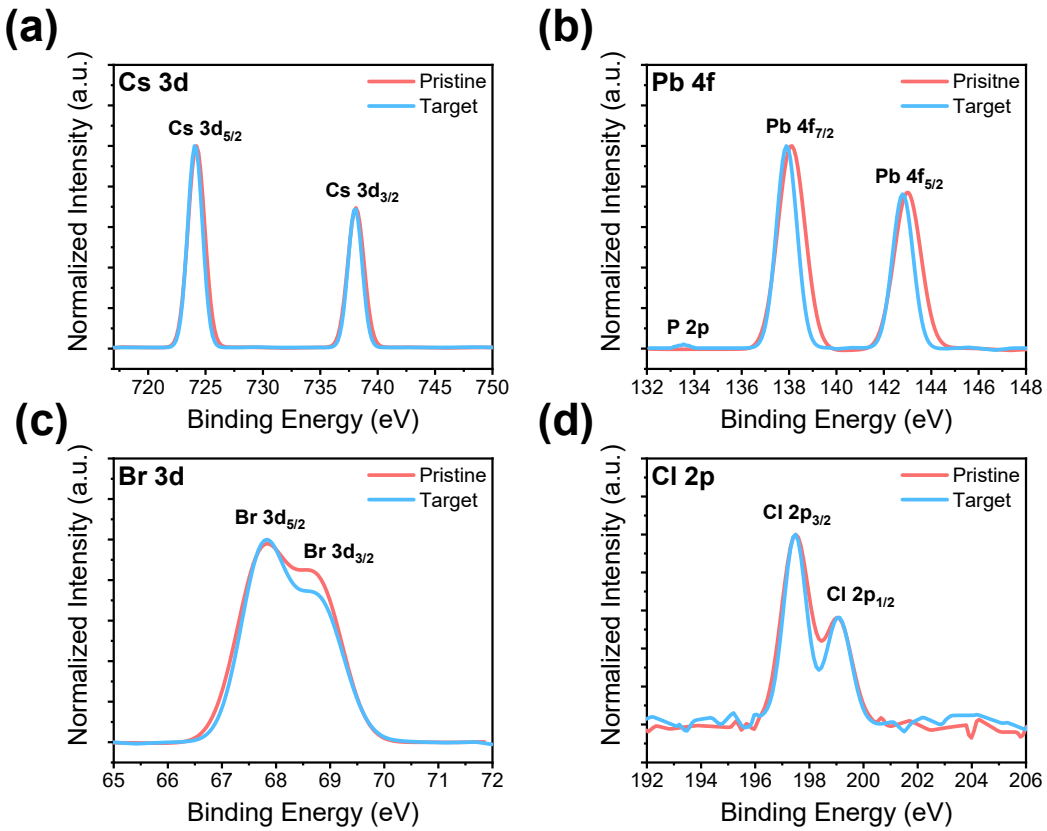

Figure S2. Binding energy spectra of pristine and doped (target) films: Normalized spectra of (a) Cs 3d, (b) Pb 4f and P 2p, and (c) Br 3d and Cl 2p.

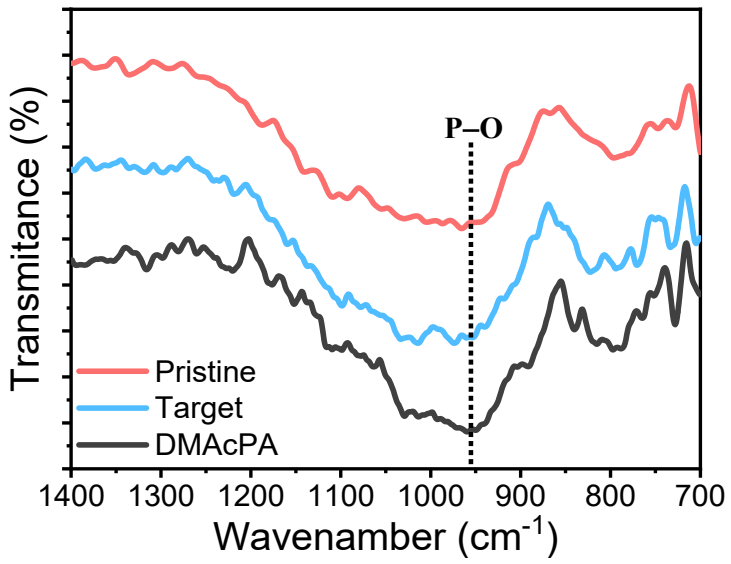

Figure S3. FTIR spectra of pristine and doped (target) films, compared with bare DMAcPA on glass.

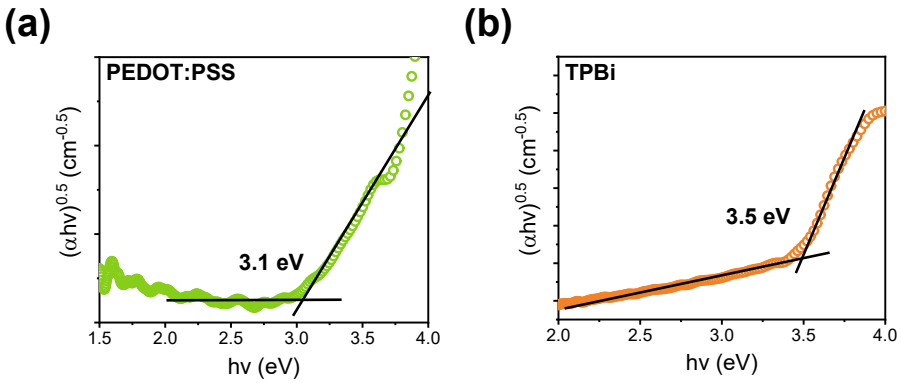

Figure S4. Tauc plot of PeLEDs: (a) PEDOT:PSS, and (b) TPBi.

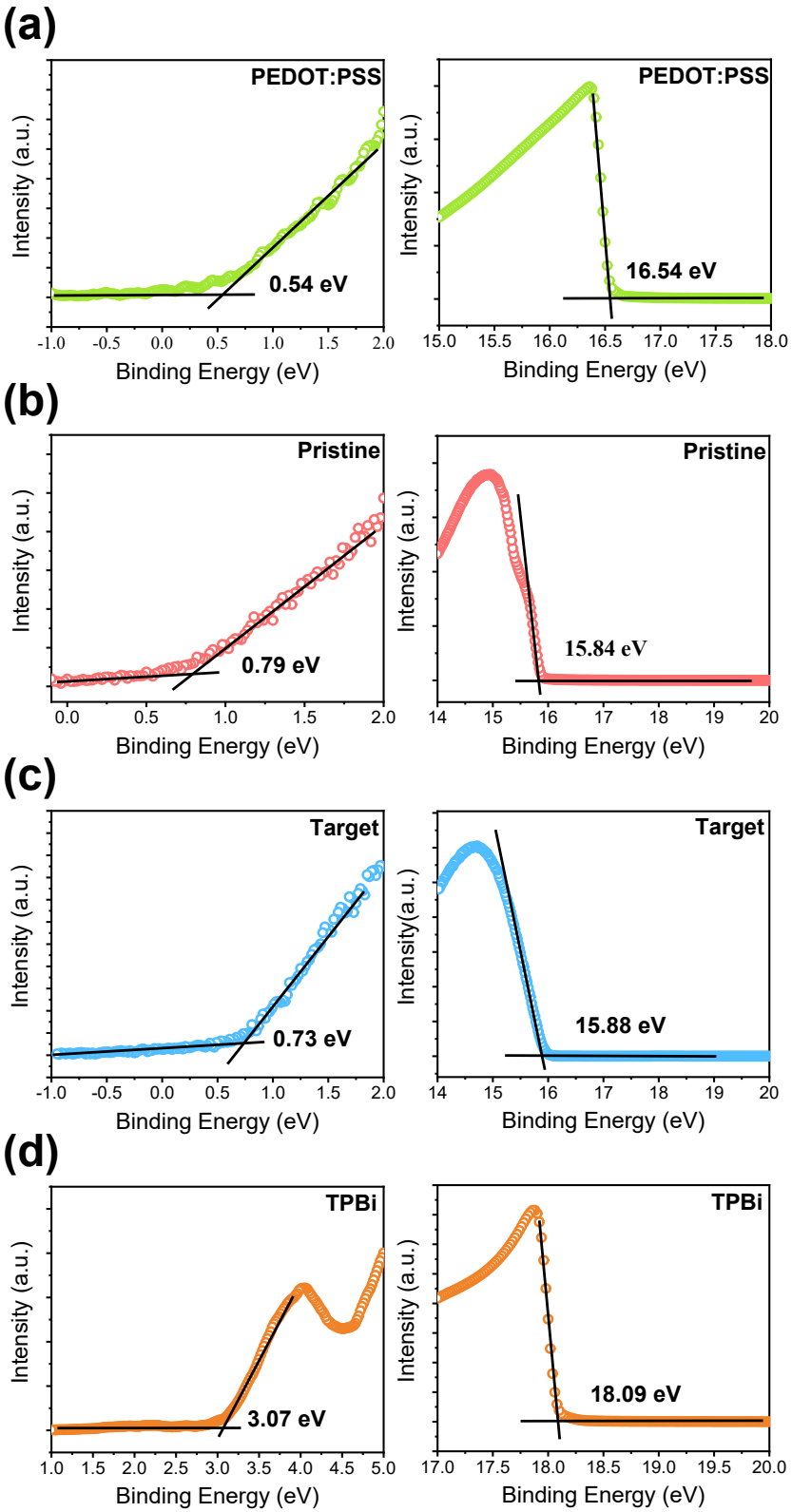

Figure S5. UPS spectra of PeLEDs: (a) PEDOT:PSS, (b) Pristine, (c) Doped (target), and (d) TPBi. A He I source with a photon energy of 21.22 eV was used for excitation in the UPS measurements. The calculated valence band energies were 5.22 eV for PEDOT:PSS, 6.17 eV for pristine, 6.07 eV for doped (target), and 6.20 eV for TPBi.

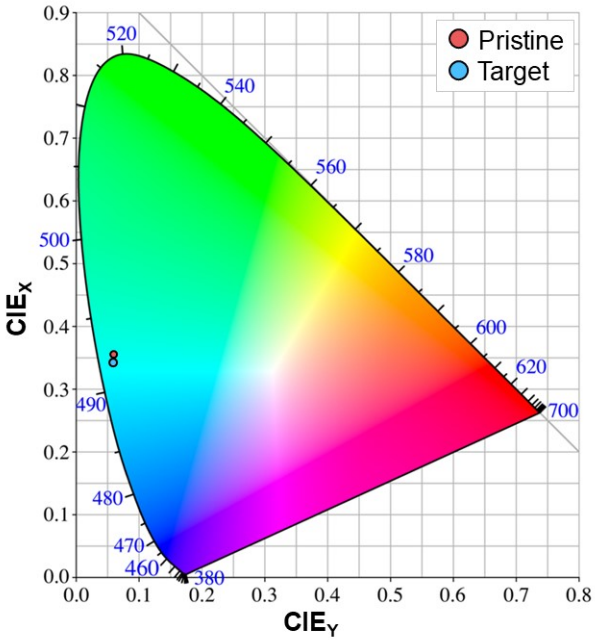

Figure S6. CIE coordinates of pristine and doped (target) PeLEDs at maximum luminance.

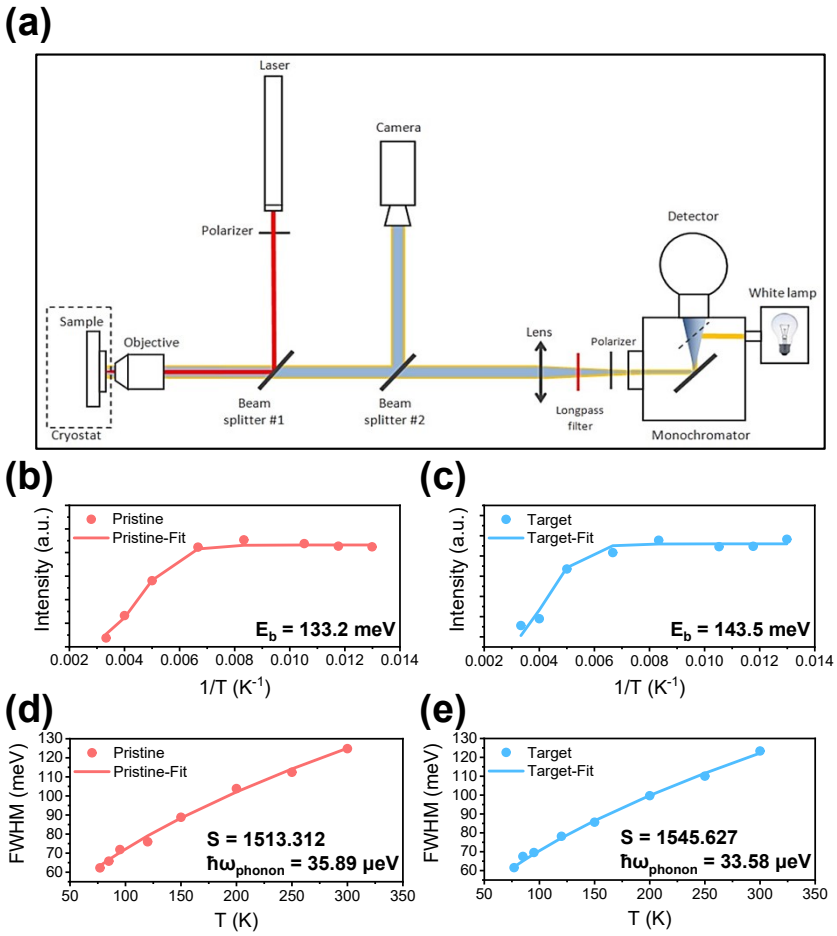

Figure S7. Temperature-dependent PL measurements and optical characteristics: (a) A schematic diagram of the optical setup for temperature-dependent PL measurements. (b) and (c) Exciton binding energy (E_b) for pristine and doped (target) films obtained from the relationship between PL intensity and $1/T$. (d) and (e) Huang-Rhys factor (S) for pristine and doped (target) films obtained by fitting the profile of FWHM vs. T.

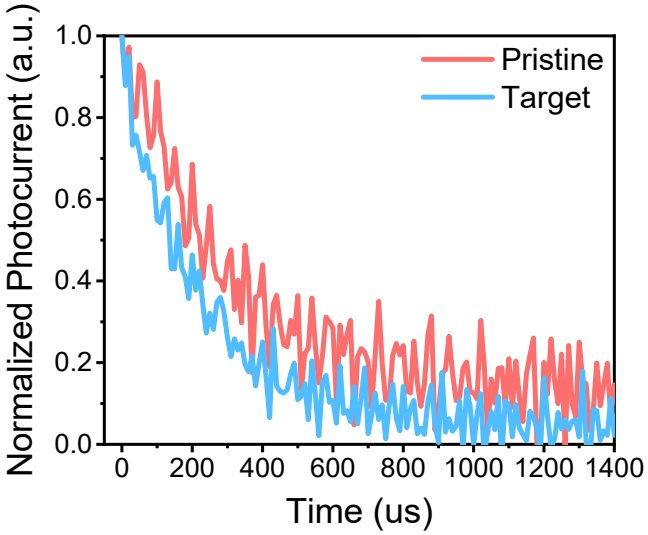

Figure S8. Normalized transient photocurrent (TPC) spectra of pristine and doped (target) devices.

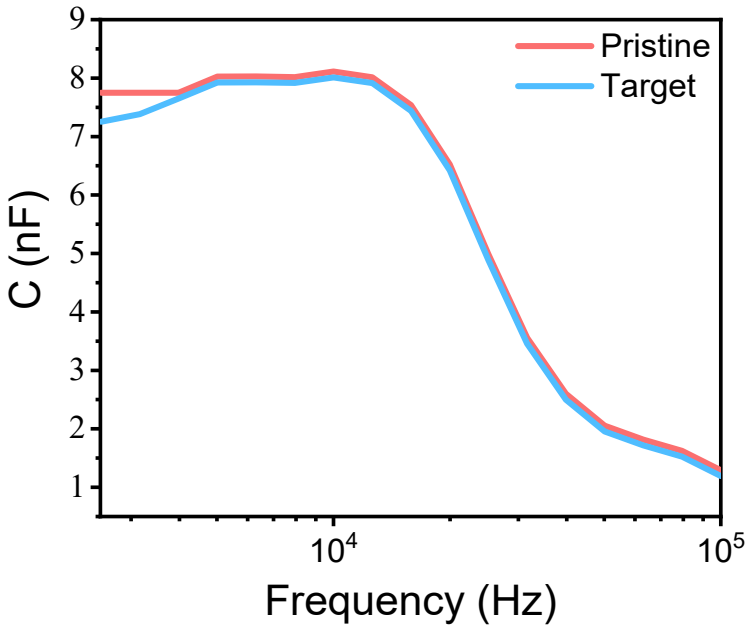

Figure S9. Extraction of the relative dielectric constant (ε_r) from capacitance-frequency measurements, using the device structure of ITO/PEDOT/perovskite/Al.

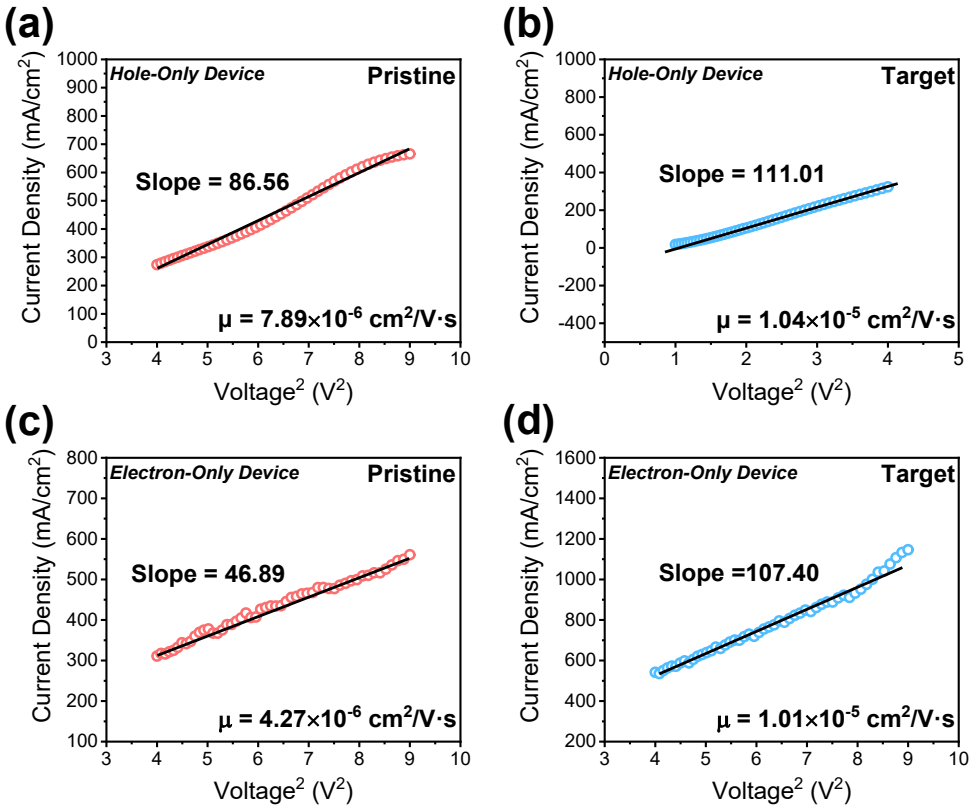

Figure S10. (a), (b)Hole mobility measurement using the SCLC method, with the hole-only devices structure ITO/PEDOT/perovskite/MoO_3/Ag. (c), (d) Electron mobility measurement using the SCLC method, with the electron-only devices structure ITO/TPBi/perovskite/TPBi/LiF/Al.

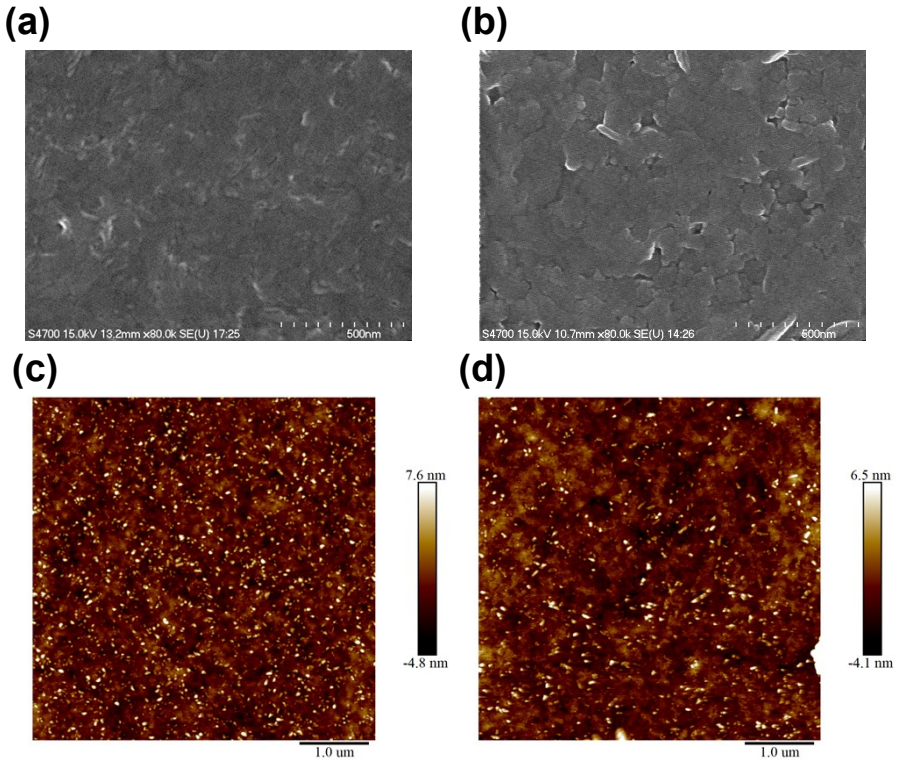

Figure S11. Sample surface images:(a), (b) Top-view scanning electron microscope (SEM) images of the pristine and doped (target) films. (c), (d) Atomic force microscope (AFM) images of the pristine and doped (target) films (scale bar: 1 μm).

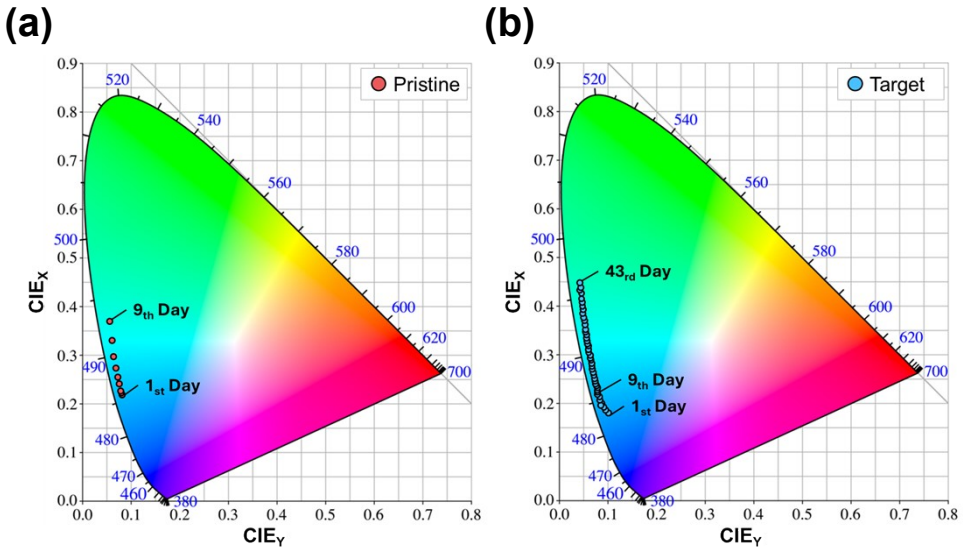

Figure S12. CIE coordinates showing the largest performance gap between pristine and doped (target) devices.

Table S1. Time-resolved photoluminescence decay fitting parameters for pristine and doped (target) perovskite films.

	A_1	τ_1	A_2	τ_2	A_3	τ_3	τ_{avg}
Pristine	1.11293	0.23608	0.03209	2.50201	0.01124	0.0594	0.765
Target	0.56036	0.17565	0.405	0.88862	0.06544	4.21157	2.041

The average exciton lifetime (τ_{avg}) was calculated using the following equation:

$$\tau_{avg} = \frac{A_1\tau_1^2 + A_2\tau_2^2 + A_3\tau_3^2}{A_1\tau_1 + A_2\tau_2 + A_3\tau_3}$$