Supporting Information for

Stable green and red dual-emissions in the single all-inorganic halide-mixed perovskites microsheet

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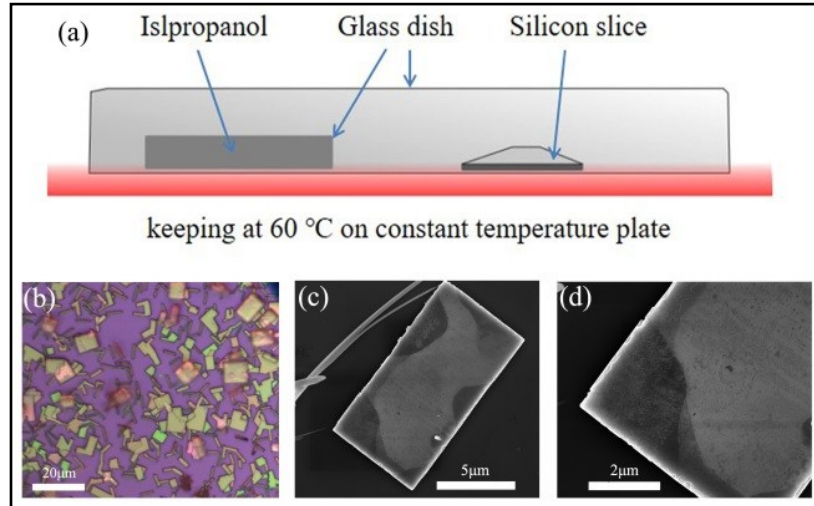
Fig. S1 (a) Synthesis schematic diagram of CsPbBr$_x$I$_{3-x}$ microsheets. (b) Optical image of as-synthesized CsPbBr$_x$I$_{3-x}$ microsheets. (c-d) SEM of single CsPbBr$_x$I$_{3-x}$ microsheet with different magnification.
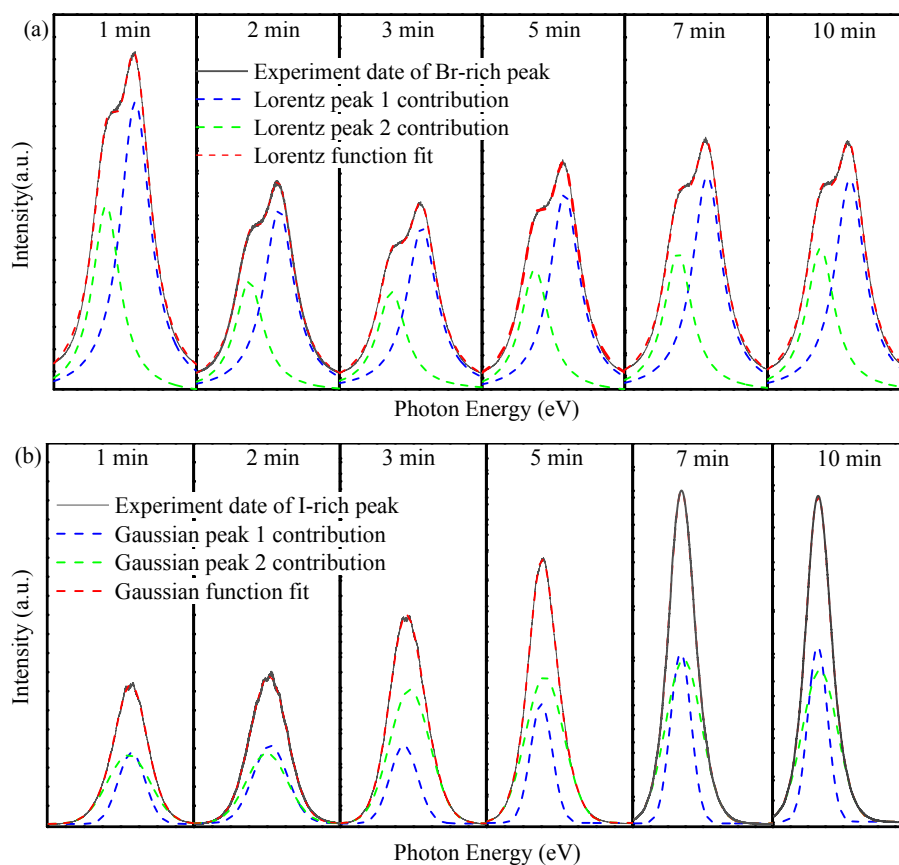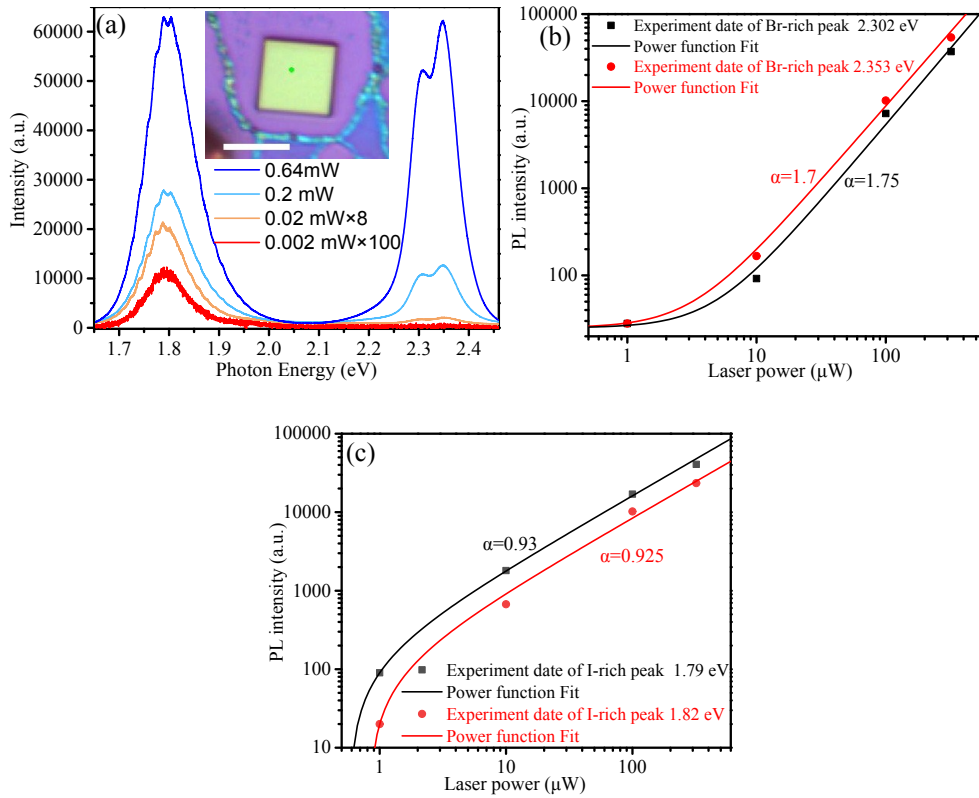
Fig. S2 (a) Lorentz decomposition of PL spectra in the range of 2.21−2.46 eV upon 1, 2, 3, 5, 7 and 10 min laser excitation. (b) Gaussian decomposition of PL spectra in the range of 1.65-2.05 eV upon 1, 2, 3, 5, 7 and 10 min laser excitation. All fitting curves exhibit two peaks.
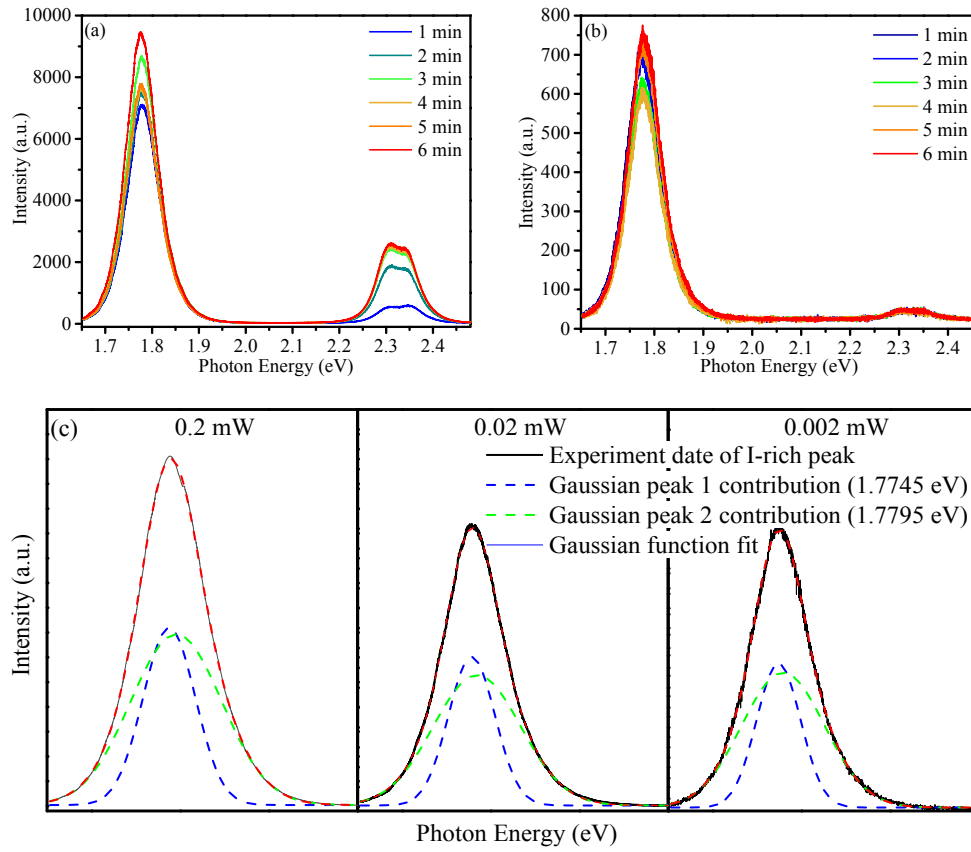
Fig. S3 (a,b) PL spectra collected at different illumination time under the laser power

of 0.3 mW and 0.03 mW (λ=355 nm) of the same CsPbBr$_x$I$_{3-x}$ micro/nanosheet in Fig.

2a. (c) Gaussian decomposition of the PL spectra in the range of 1.65−2 eV with

different laser power.
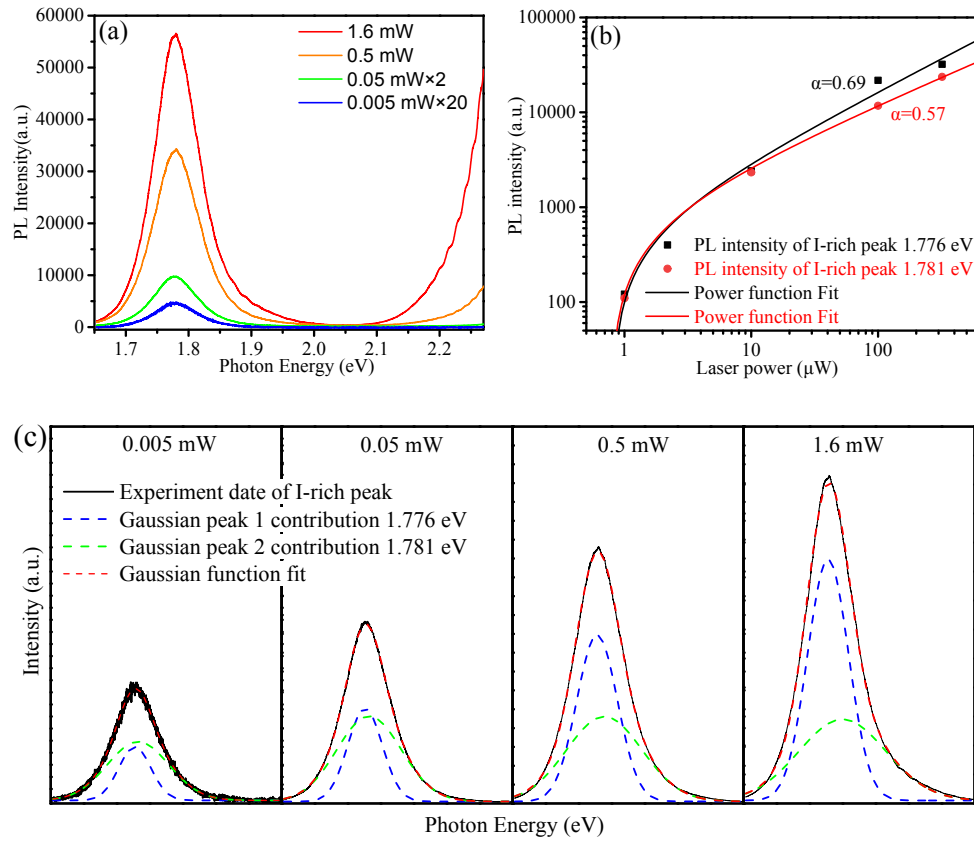
Fig. S4 (a) Power-dependent PL spectra under excitation of 532 nm CW laser. (b) Log-log plot of PL intensity versus laser intensity for the I-rich peaks extracted from Fig. S4a (points). The solid lines are fitting curves using power function. (c) Gaussian decomposition of PL spectra in the range of 1.65−2 eV under different laser power.

Fig. S5 (a) Power-dependent PL spectra of another selected single CsPbBr$_x$I$_{3-x}$ micro-sheet different from the one in main text. Inset is corresponding optical image. (b,c) Log-log plot of PL intensity versus laser power for Br-rich and I-rich peaks extracted from Fig. S5a, respectively.
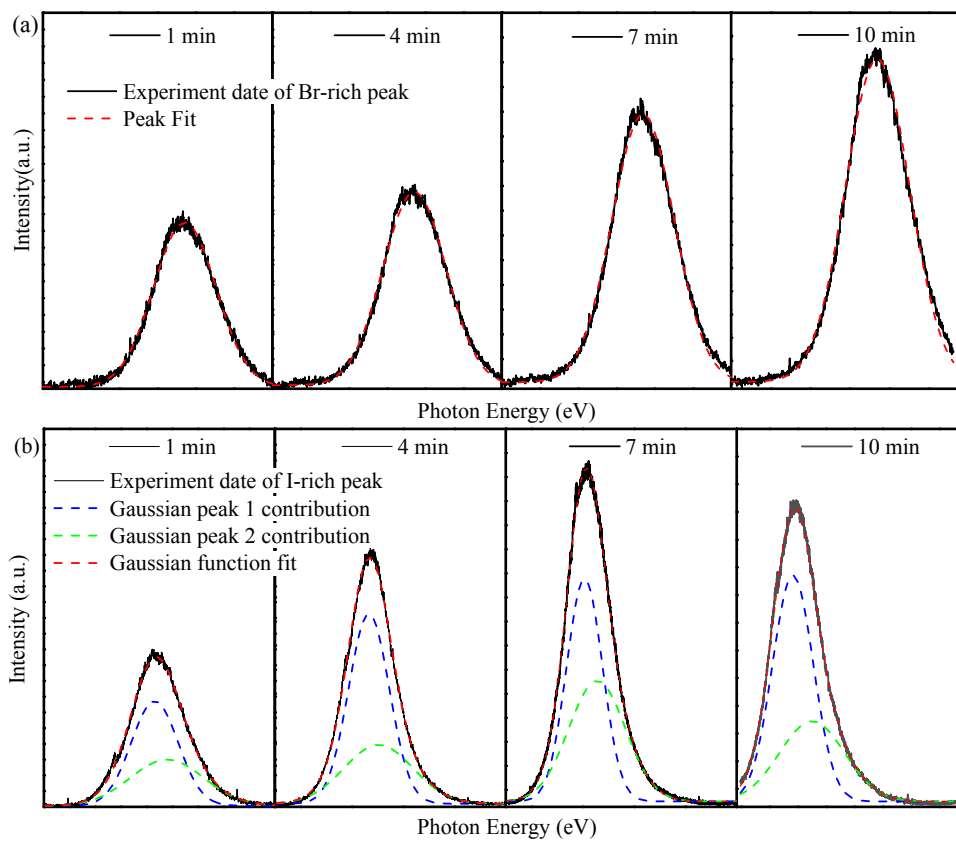
Fig. S6 (a) Gaussian decomposition of PL spectra in the range of 2.15−2.45 eV under illumination time of 1, 4, 7 and 10 min. (b) Gaussian decomposition of PL spectra in the range of 1.65−2.1 eV under illumination time of 1, 4, 7 and 10 min.

Table S1. The corresponding lifetime constants and amplitudes of Br-rich peaks.

	A_1	τ_{Br}^{1} (ns)	A_2	τ_{Br}^{2} (ns)
1 min	40.6%	5.75	59.4%	1.33
4 min	64.4%	4.987	35.6%	1.39
7 min	66.1%	6.649	33.9%	1.518
10 min	65.9%	7.546	34.1%	1.881

Table S2. The corresponding lifetime constants and amplitudes of I-rich peaks.

	A_1	τ_{I}^{1} (ns)	A_2	τ_{I}^{2} (ns)	A_3	τ_{I}^{3} (ns)
1 min	240.6%	4.337	-128.2%	3.655	-12.4%	0.49
4 min	198.9%	6.374	-69.3%	7.452	-29.6%	4.67
7 min	104.3%	7.26	-11.5%	10.4	7.2%	3.21
10 min	95.2%	7.72	-8.8%	11.2	13.6%	2.44
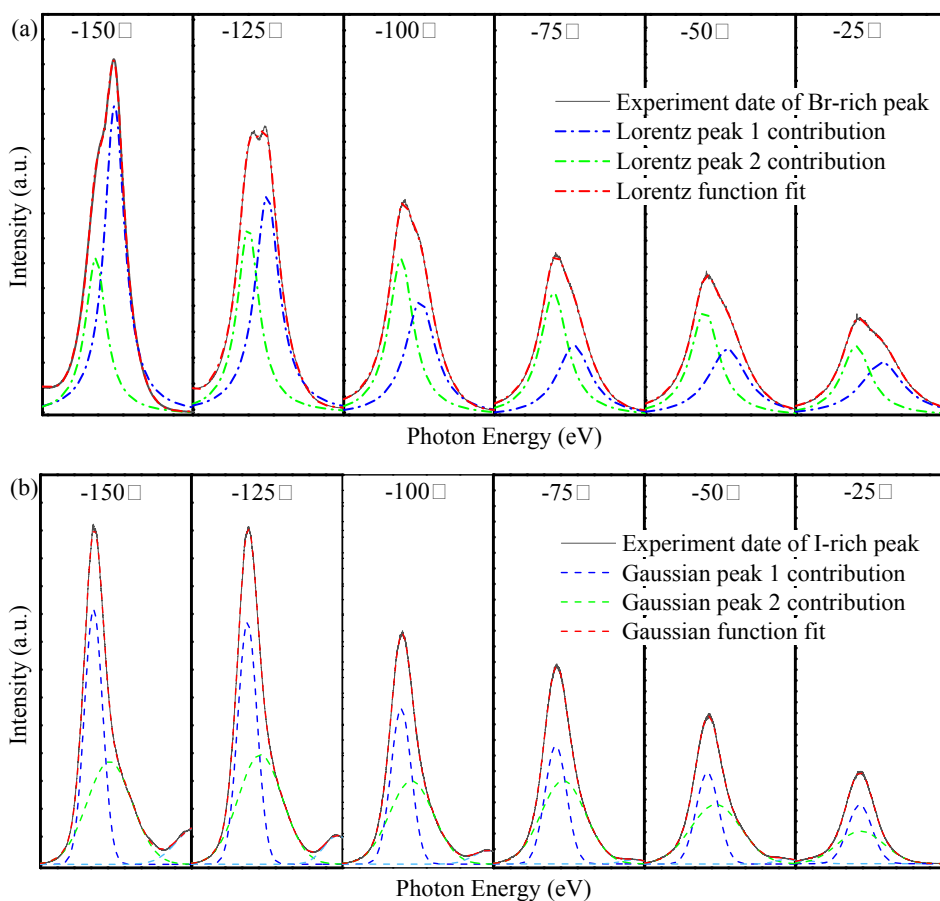
Fig. S7 (a) Lorentz decomposition of PL spectra in the range of 2.27−2.42 eV at temperature of −25 ℃, −50 ℃, −75 ℃, −100 ℃, −125 ℃ and −150 ℃. (b) Gaussian decomposition of PL spectra in the range of 1.75−2.2 eV at temperature of −25 ℃, −50 ℃, −75 ℃, −100 ℃, −125 ℃ and −150 ℃. All the fitting curves exhibit two peaks.