

Electronic Supplementary Information

Crystallization Control via a Molecular Needles Knitting Strategy on the Enhanced Emission Efficiency and Stability of CsPbBr₃ Films

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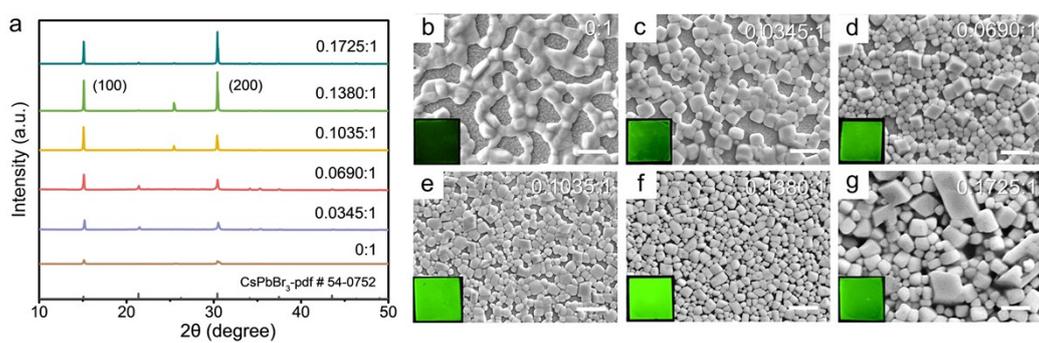


Fig. S1 (a) XRD patterns and (b-g) SEM images of the perovskite films with different contents of PEO. The white scale bar is 1 μm .

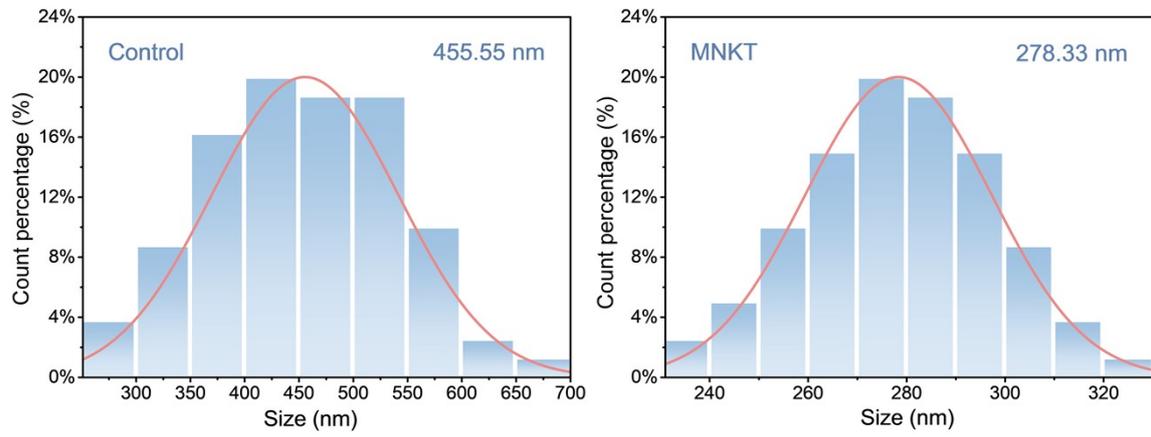


Fig. S2 The statistical chart of particle size distribution of the control film and the MNKT-based film.

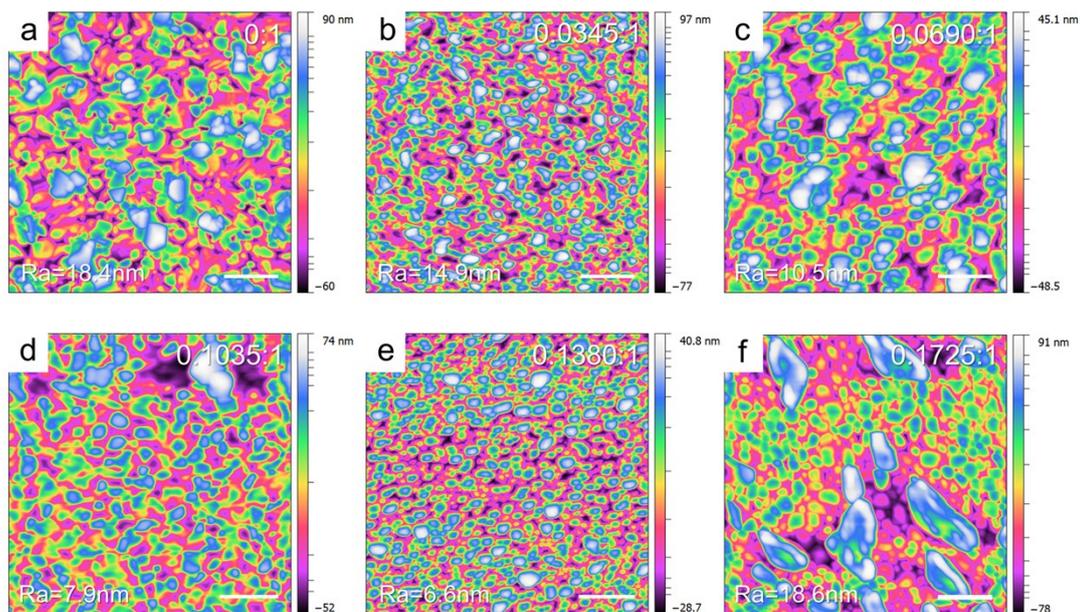


Fig. S3 AFM images of the CsPbBr₃ films with different contents of PEO. The white scale bar is 1 μm.

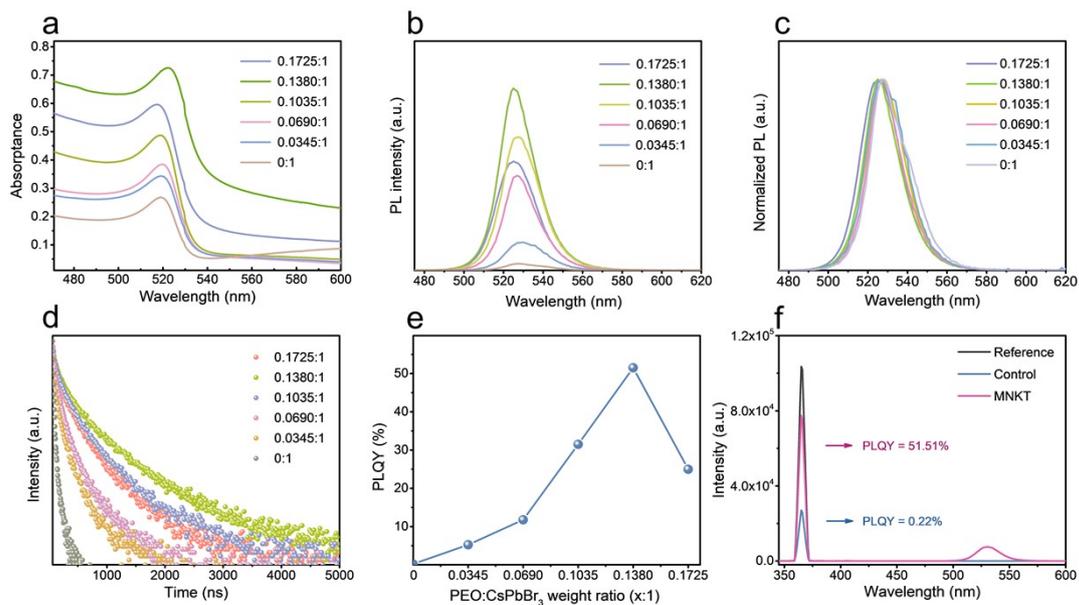


Fig. S4 (a) UV absorption, (b) PL spectra, (c) the normalized PL spectra, (d) time-resolved PL decays and (e) PLQY of pristine and optimized CsPbBr₃ films with different PEO ratios. (f) A detail observation of PLQY spectra of the films with and without MNKT strategy.

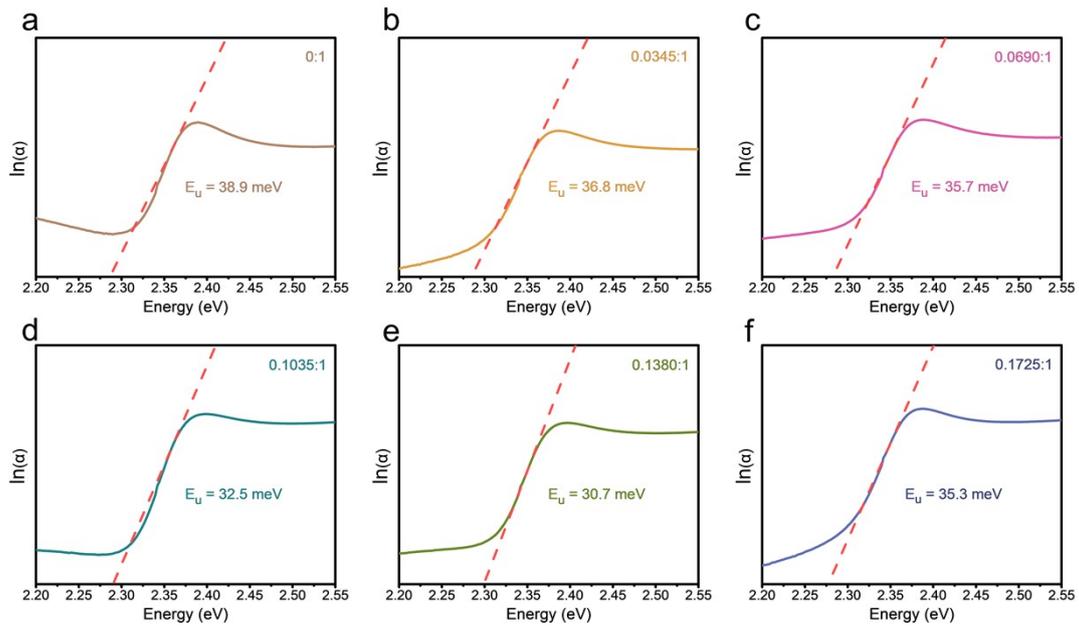


Fig. S5 The E_U of the CsPbBr_3 films with different contents of PEO quantified from Tauc Plot.

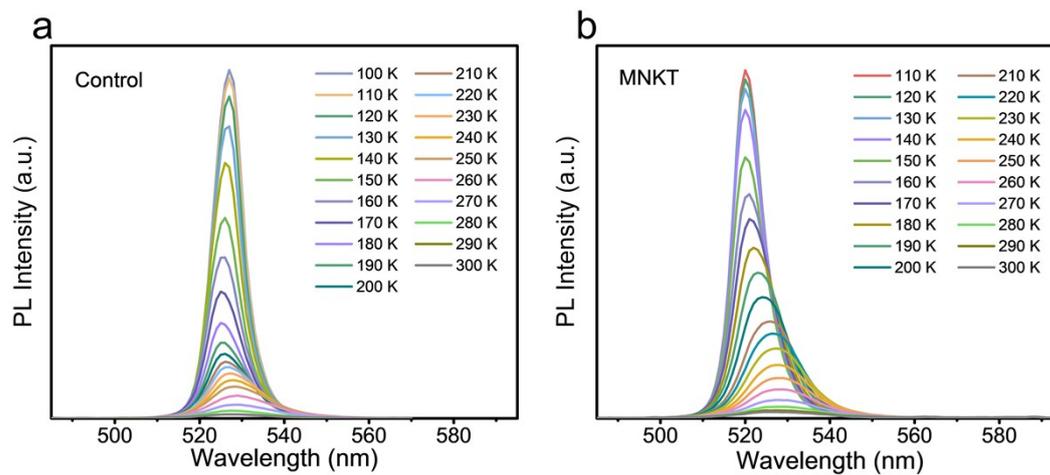


Fig. S6 The temperature-dependent PL spectra of the films before and after MNKT management.

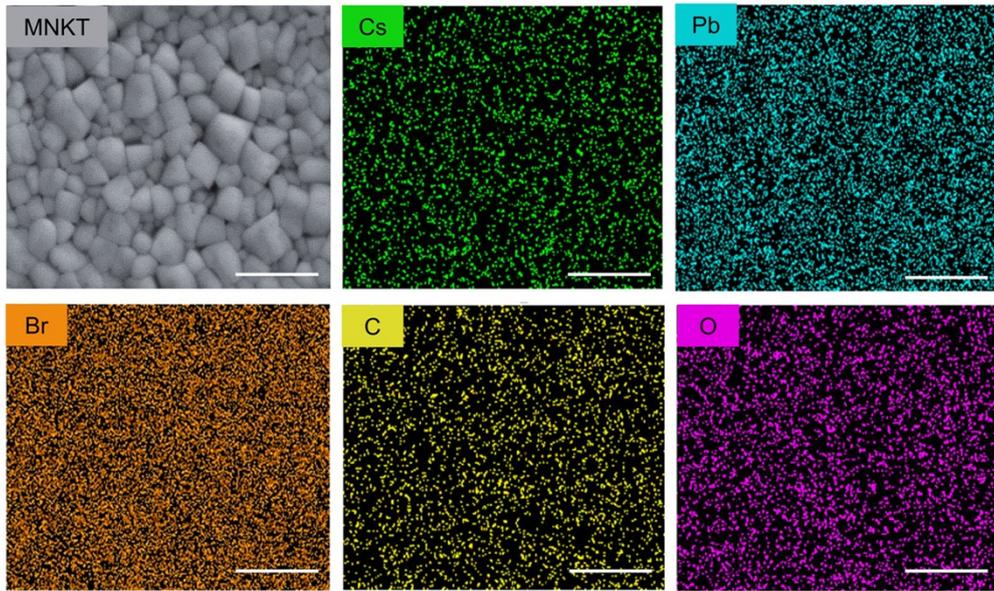


Fig. S7 The EDS elemental mapping images and the concrete element contents of the MNKT-based film. The white scale bar is 1 μm .

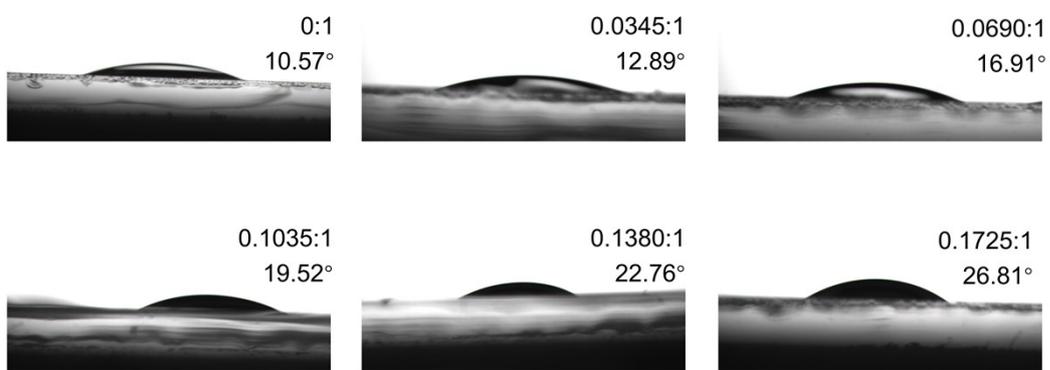


Fig. S8 The contact angle between CsPbBr₃ films with different PEO contents and water droplets.

Table S1 Parameters of the perovskite films with various weight ratios of PEO.

PEO:CsPbBr ₃ (weight ratio)	τ_1 (ns)	τ_2 (ns)	τ_{ave} (ns)	PLQY (%)	K_r ($\times 10^6$ s ⁻¹)	K_{nr} ($\times 10^7$ s ⁻¹)
0:1	5.26	22.36	5.26	0.22	0.4182	18.9678
0.0345:1	11.79	96.40	12.03	5.24	4.3553	7.8762
0.0690:1	21.19	127.67	25.87	11.77	4.5503	3.4110
0.1035:1	31.64	267.75	56.11	31.49	5.6123	1.2210
0.1380:1	39.82	366.39	82.67	51.51	6.2305	0.5865
0.1725:1	28.78	245.90	45.54	24.98	5.4855	1.6474