

Supporting Information

A Confined Fabrication of Perovskite Quantum Dots in Oriented MOF Thin Film

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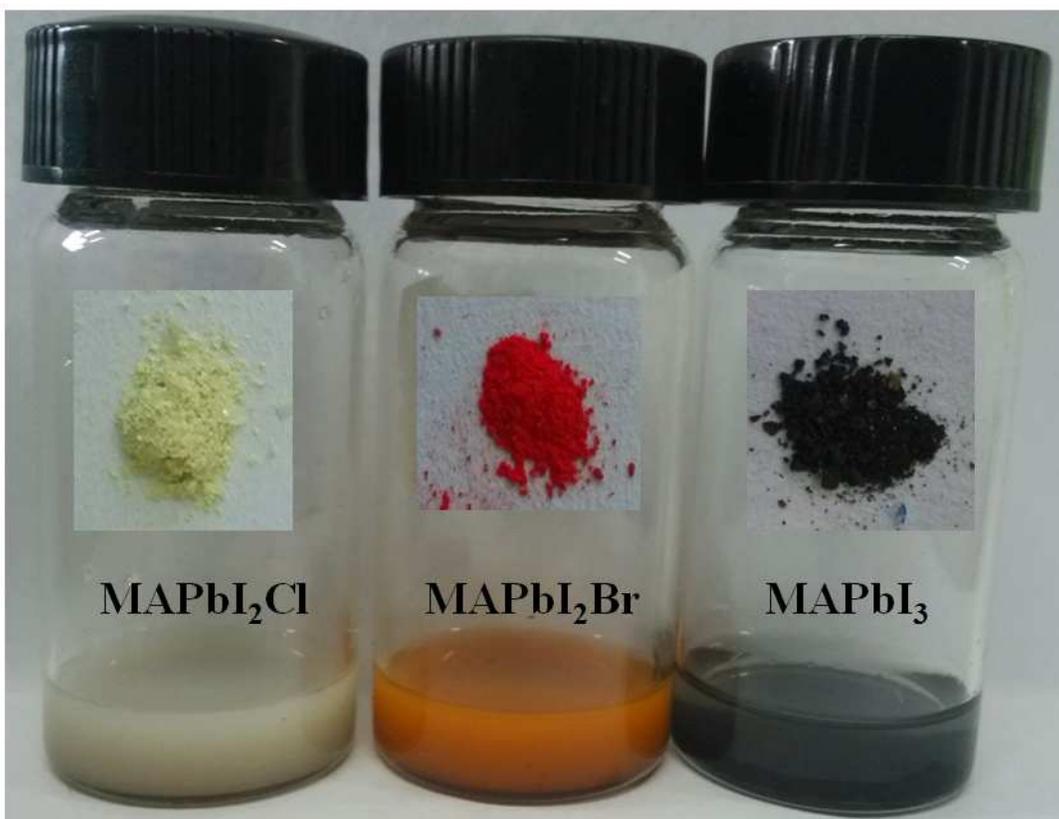


Figure S1. The optical images of powder sample MAPbI_2X ($\text{X} = \text{Cl}, \text{Br}$ and I).

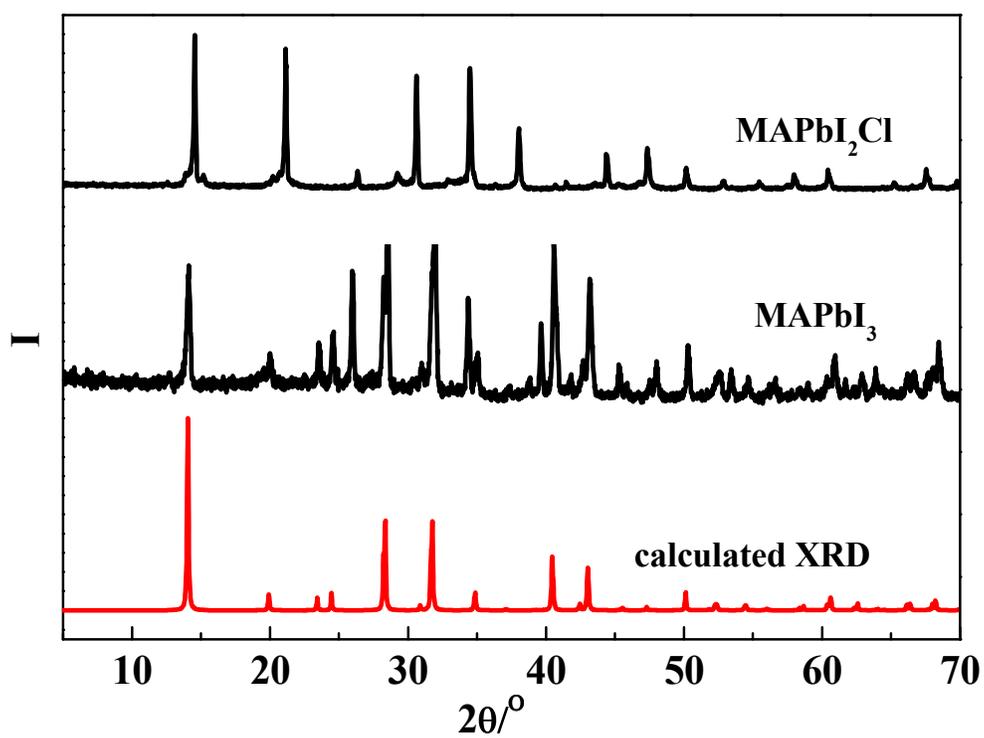


Figure S2. XRD of powder sample MAPbI_2X ($\text{X} = \text{Cl}, \text{Br}$ and I).

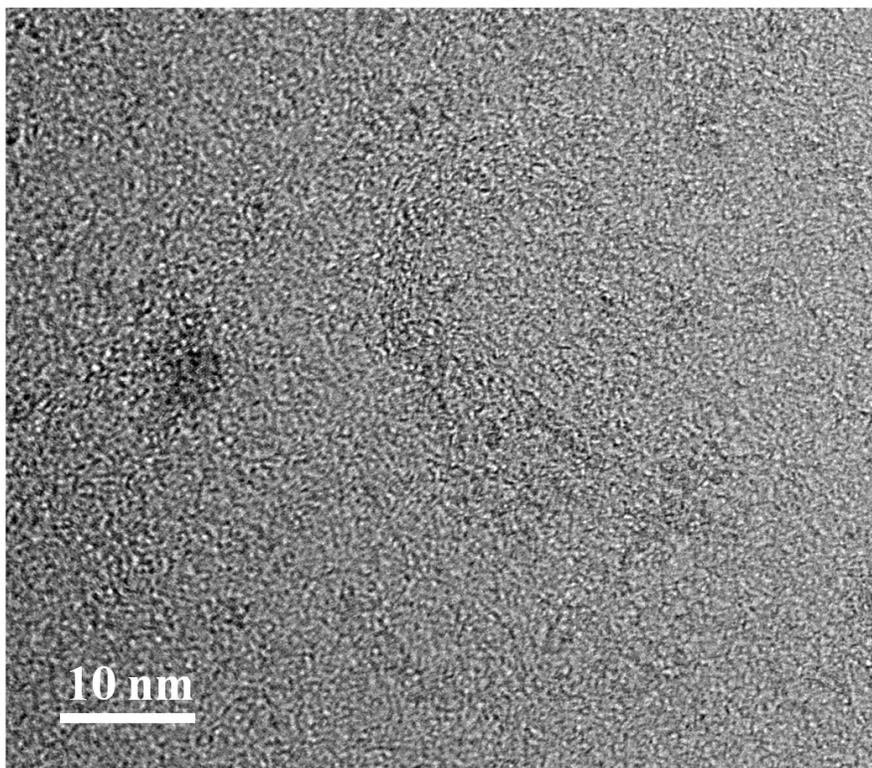


Figure S3. TEM images of pristine HKUST-1 thin film.

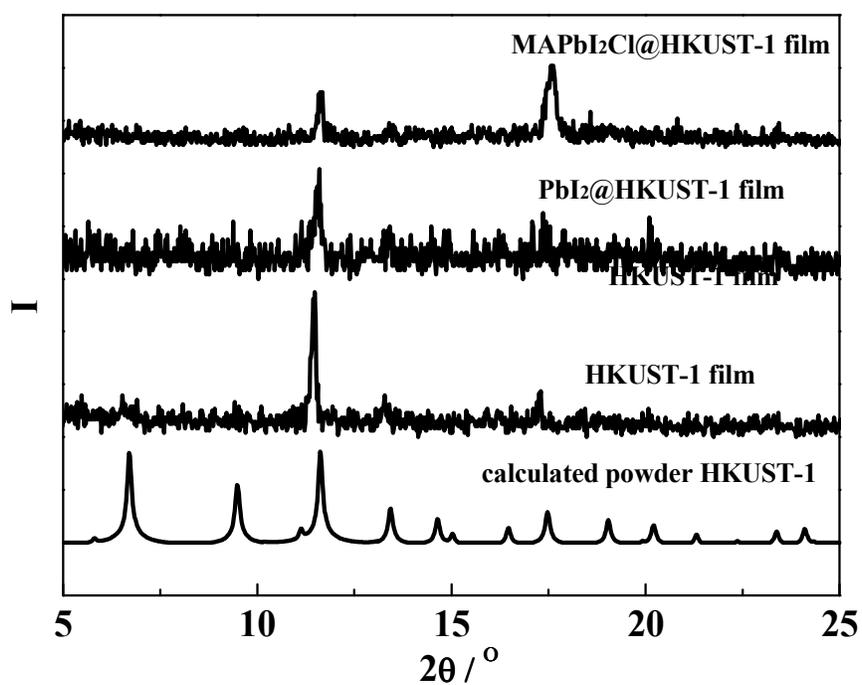


Figure S4. The XRD data of pre-synthesized HKUST1-1 thin film by LPE approach, PbI₂@HKUST-1 thin film and MAPbI₂Cl@HKUST-1 thin film.

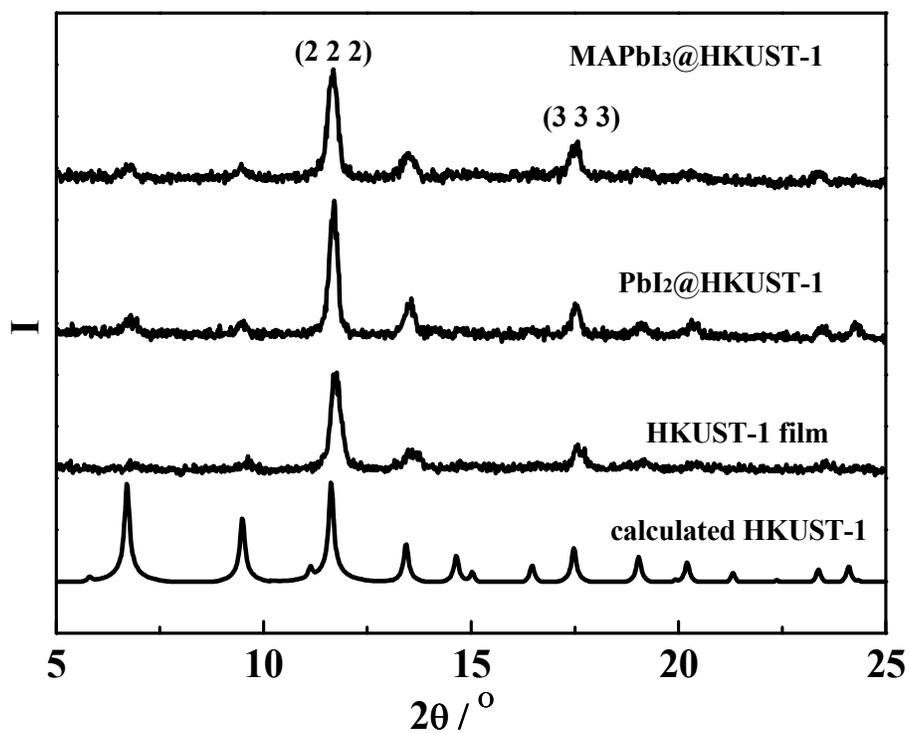


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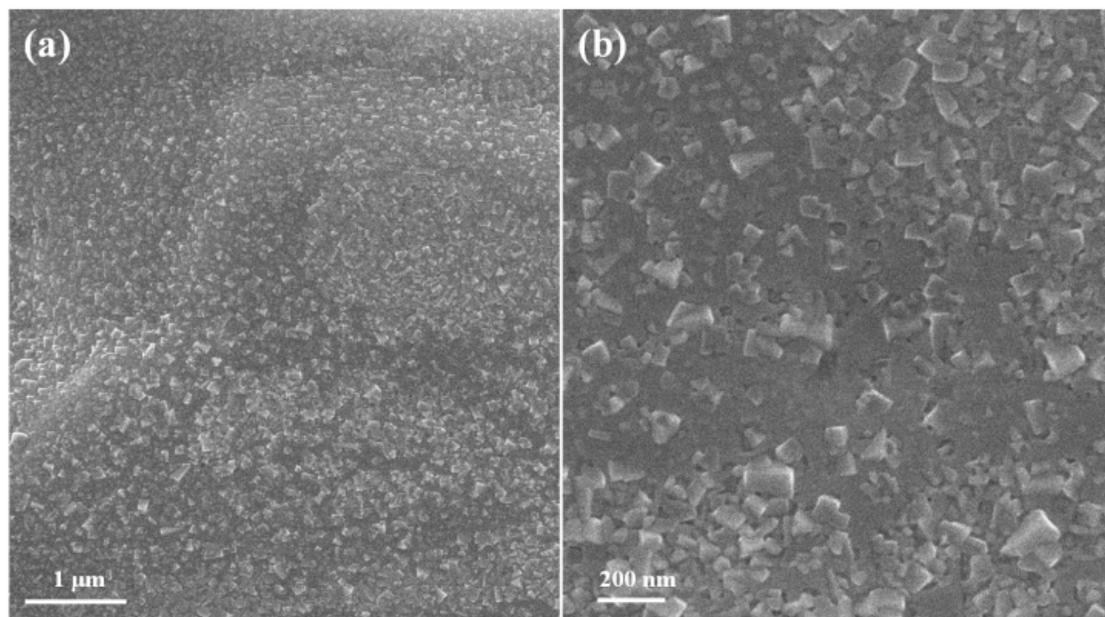


Figure S6 . SEM images (a, b) of MAPbI₂Br@HKUST-1 thin film.

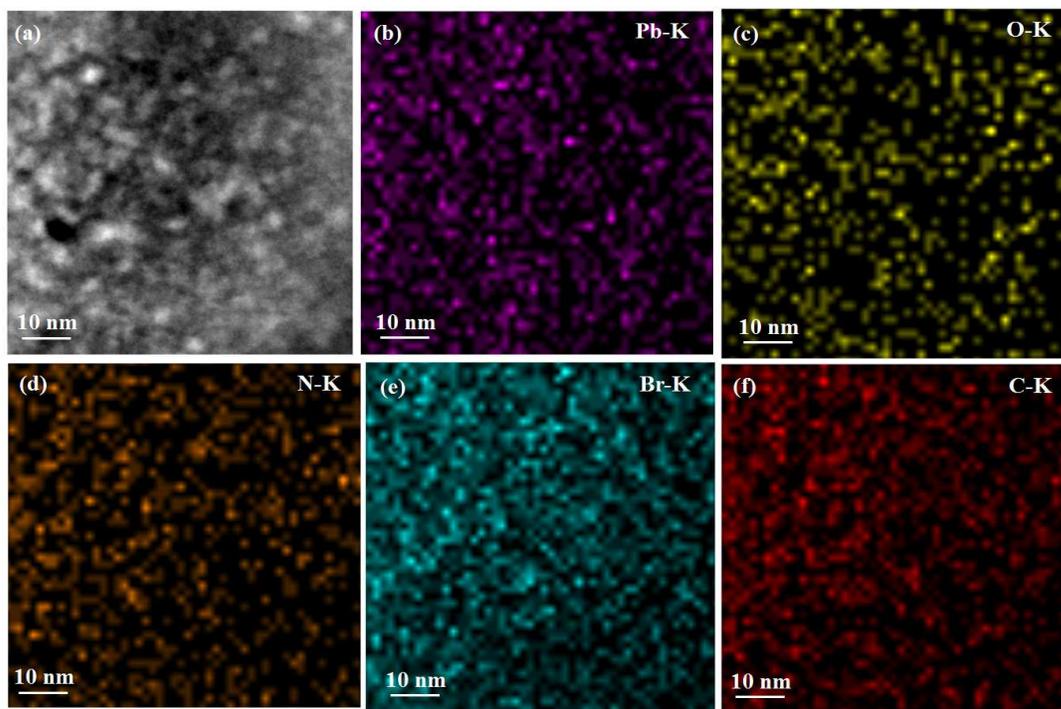


Figure S7. Electron mapping (c,d,f~h) of Pb, I, Br and C in MAPbI₂Br@HKUST-1 thin film.

Table S1. The luminescence lifetimes of Ln(pdc)₃ powder MAPbI₂X (X = Cl, Br and I) and MAPbI₂X QDs loaded into HKUST-1 thin film (MAPbI₂X@HKUST-1).

	Luminescence lifetimes
Powder MAPbI ₂ Cl	1.872 μs
Powder MAPbI ₂ Br	1.949 μs
Powder MAPbI ₃	2.03 μs
MAPbI ₂ Cl@HKUST-1 film	1.992 μs
MAPbI ₂ Br@HKUST-1 film	2.175 μs
MAPbI ₃ @HKUST-1 film	2.10 μs

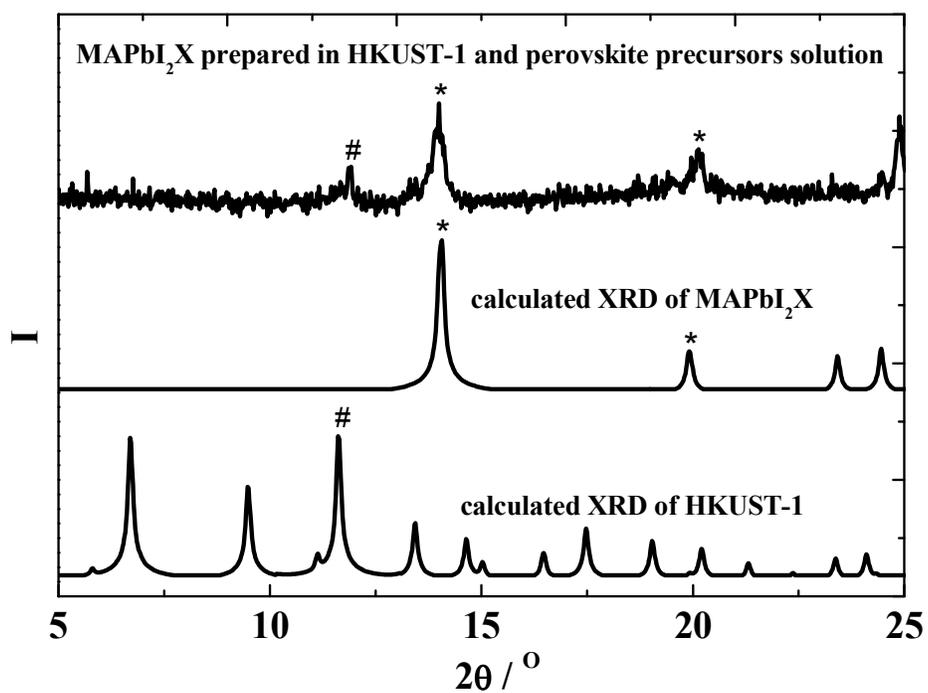
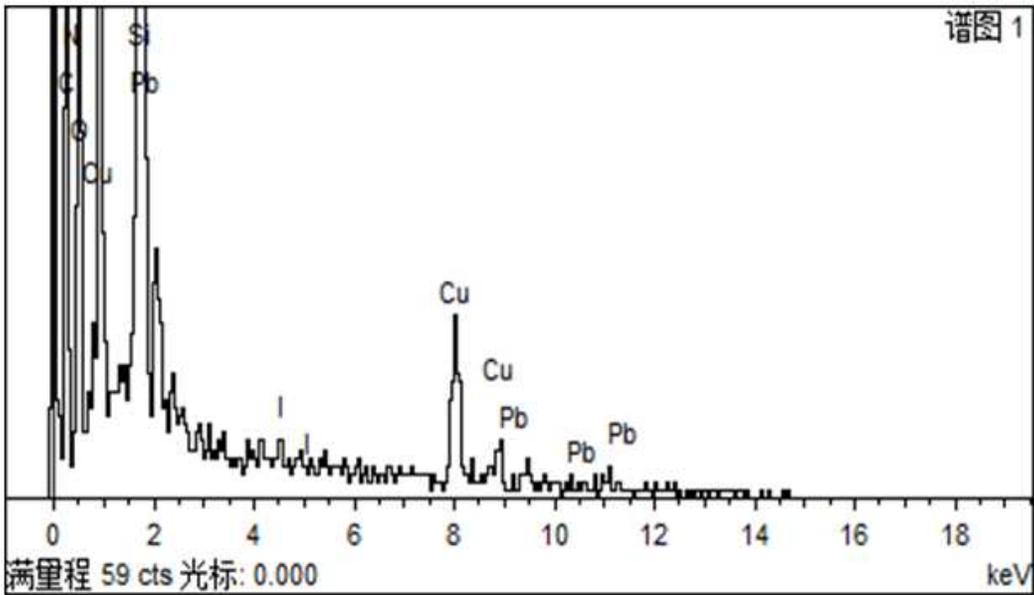
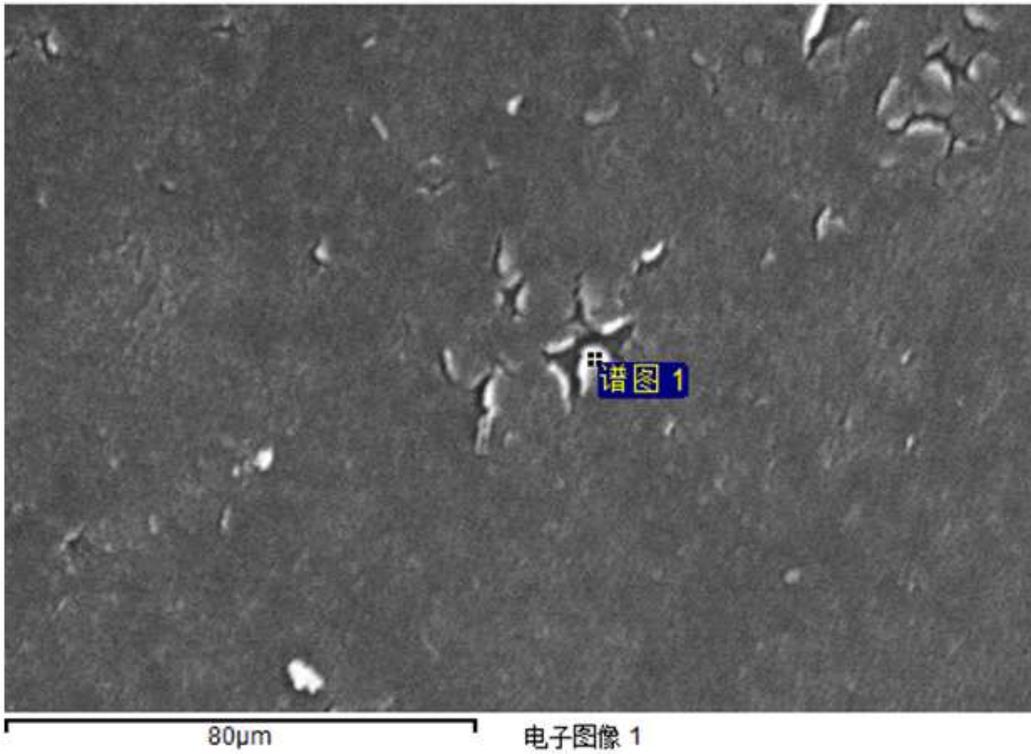
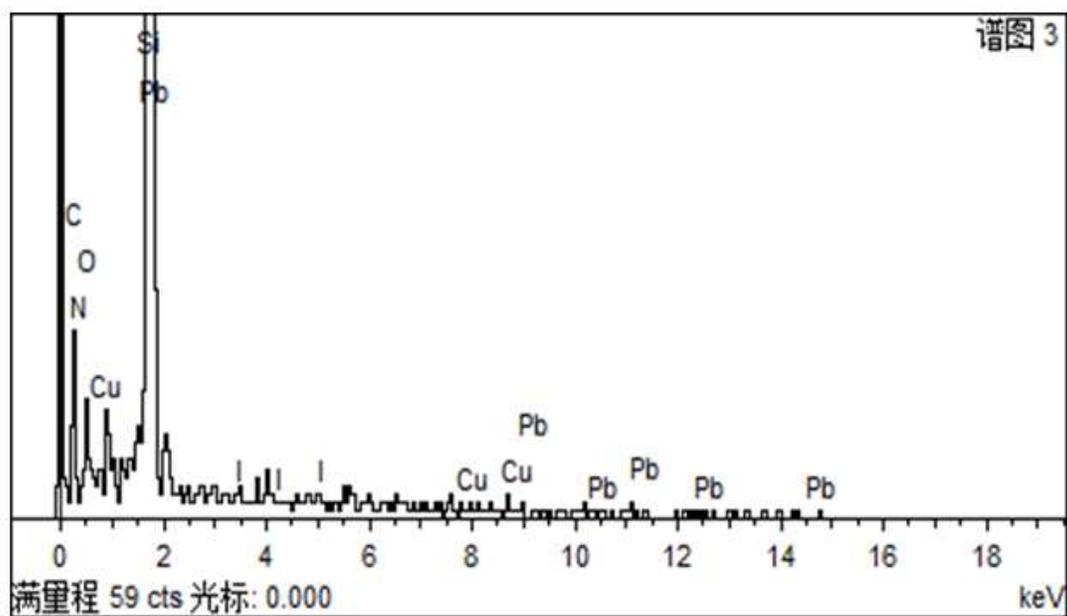
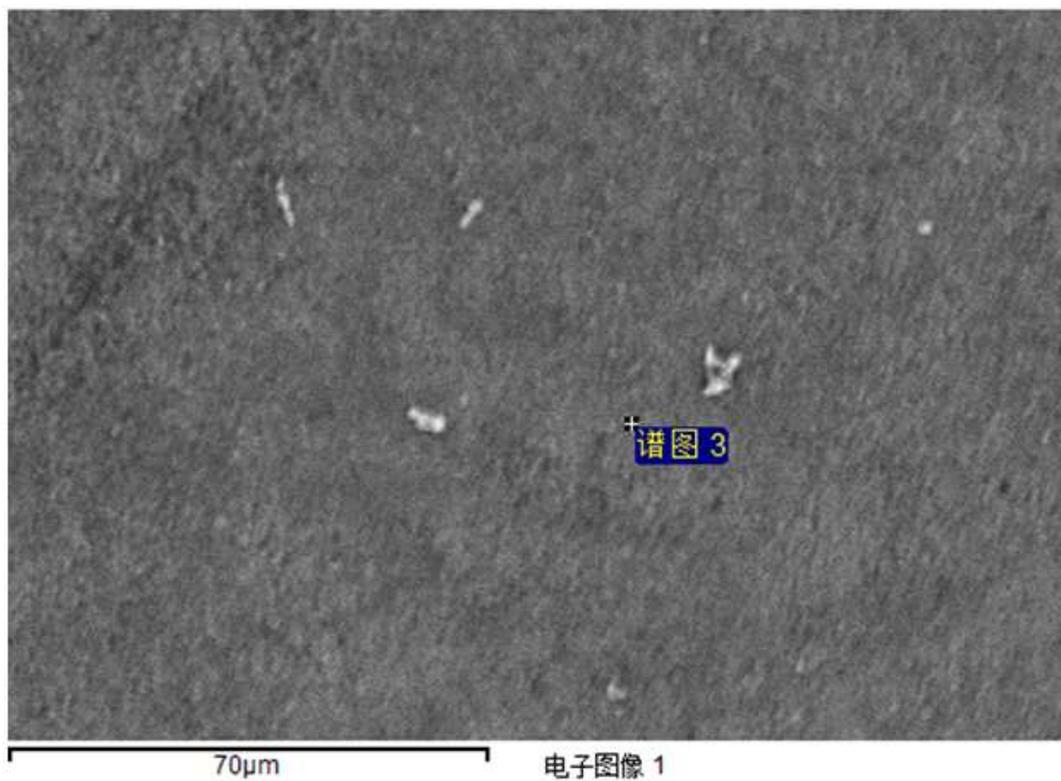


Figure S8. The XRD of MAPbI₂Br was prepared in HKUST-1 precursors Cu(OAc)₂ (1 mM), H₃BTC (0.2 mM) and perovskite CH₃NH₃Br (1 mM) and PbI₂ (1 mM) precursors solutions.



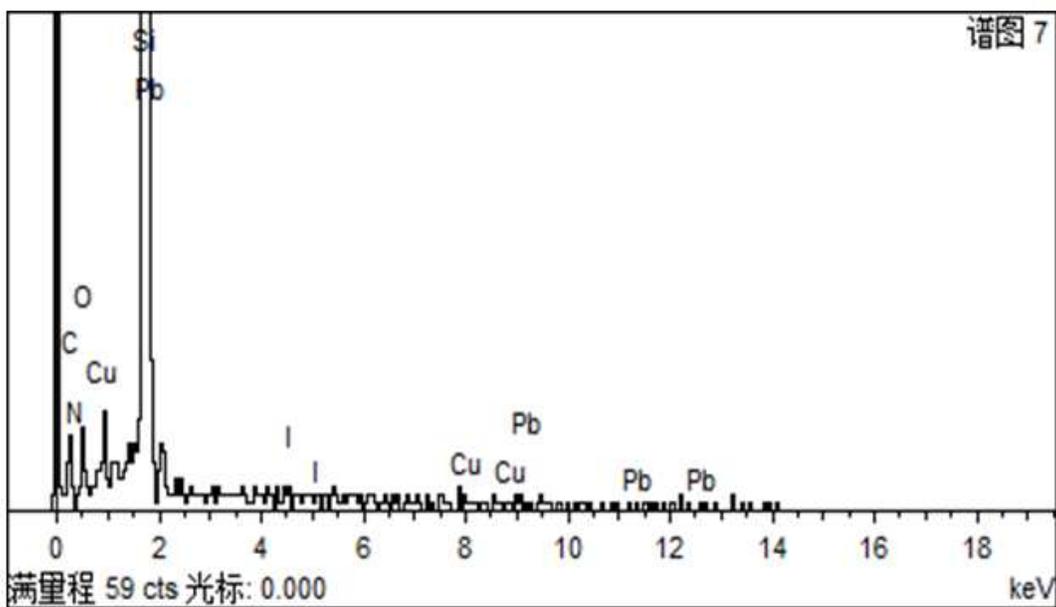
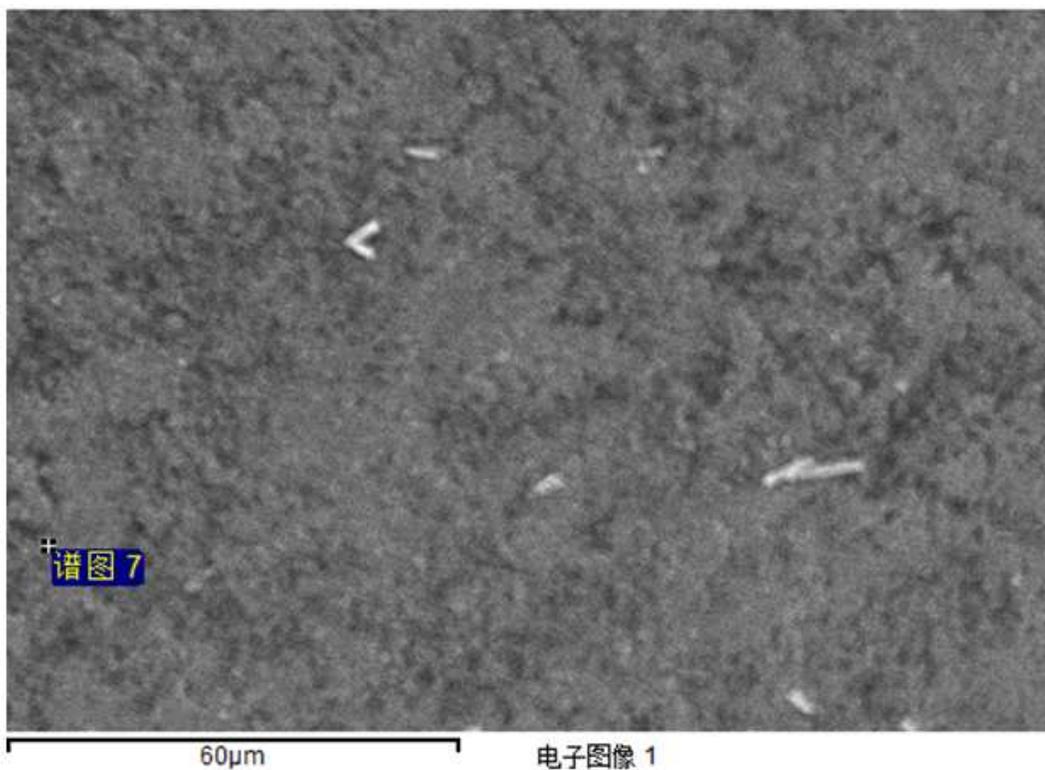
$$\text{Pb:Cu} = 0.0688$$

Figure S9. The EDS of PbI₂@HKUST-1 thin film after immersing into PbI₂ (1 mM) for 2 min.



$$\text{Pb:Cu} = 0.1904$$

Figure S10. The EDS of PbI₂@HKUST-1 thin film after immersing into PbI₂ (1 mM) for 5 min.



$$\text{Pb:Cu} = 0.2735$$

Figure S11. The EDS of PbI₂@HKUST-1 thin film after immersing into PbI₂ (1 mM) for 15 min.

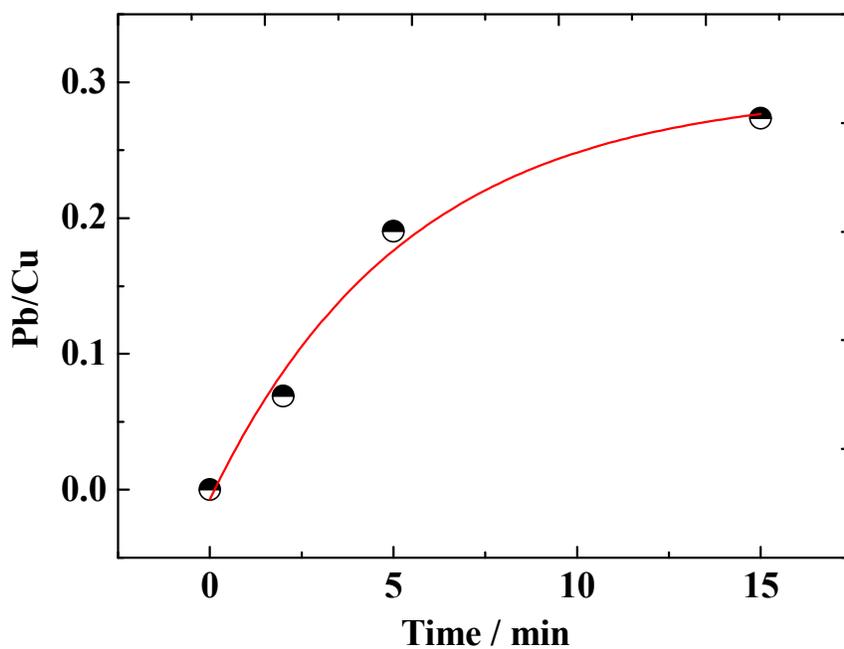


Figure S12. The Pb/Cu ratio in the composite thin film after immersing into PbI_2 (1 mM) for 2, 5 and 15 min.

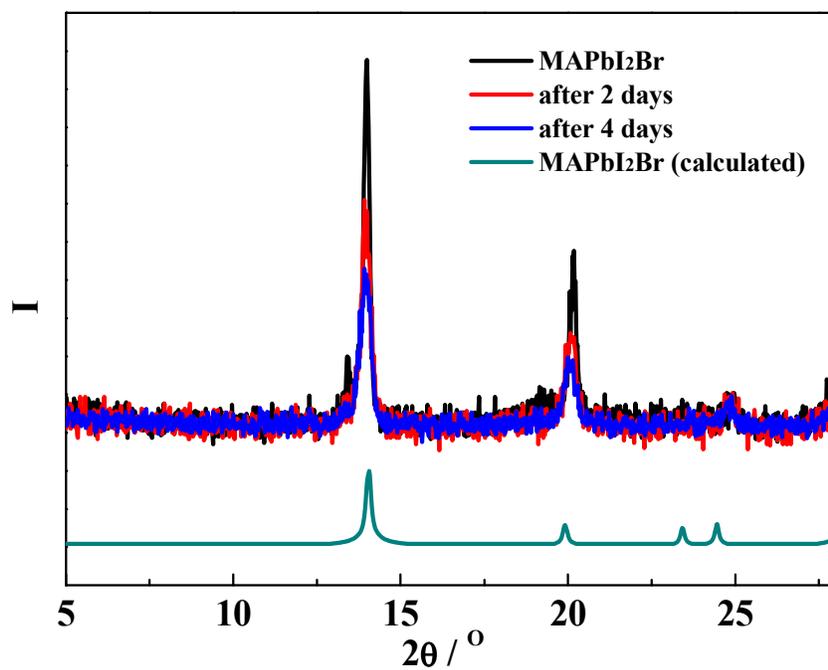


Figure S13. The XRD of powder MAPbI_2Br after exposing to moist air with 70% humidity for 2 and 4 days.

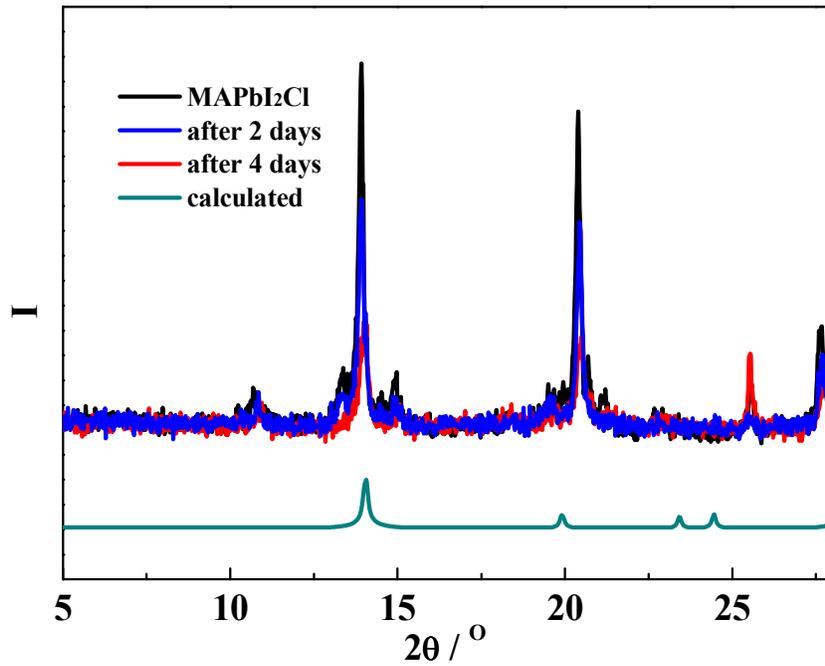


Figure S14. The XRD of powder MAPbI_2Cl after exposing to moist air with 70% humidity for 2 and 4 days.

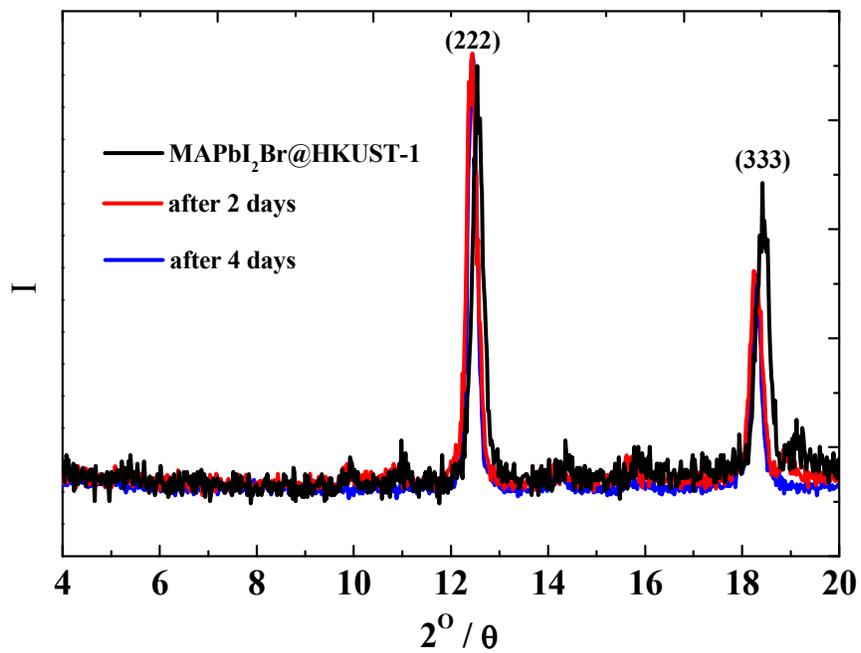


Figure S15. The XRD of $\text{MAPbI}_2\text{Br@HKUST-1}$ thin film after exposing to moist air with 70% humidity for 2 and 4 days.

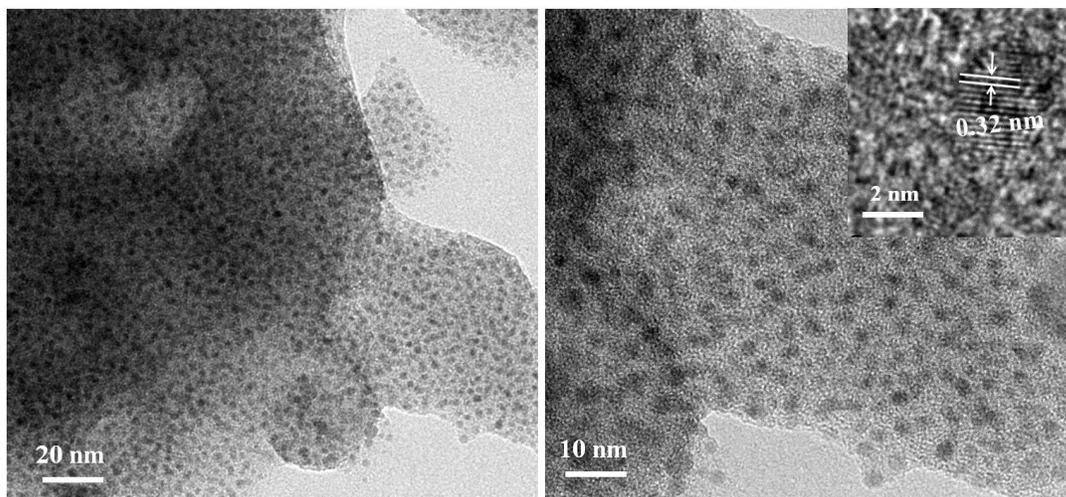


Figure 16. The TEM image with lattice spacing of MAPbI₂Br QDs@HKUST-1 thin film after exposing to moist air with 70% humidity for 4 days.

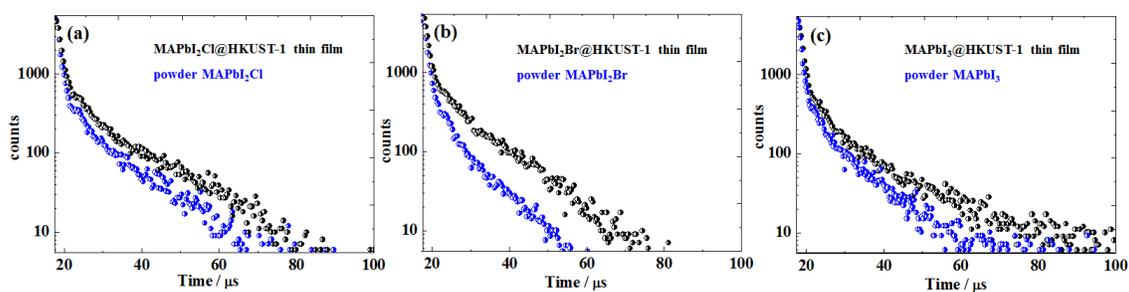


Figure S17. The solid-state photoluminescent life time of the MAPbI₂X@HKUST-1 thin films and their powder samples.: (a) X=Cl; (b) X=Br and (c) X=I.