

Supporting Information

Lead-Free Cs_3MnCl_5 and CsMnCl_3 Crystals: Rapid on-chip Crystallization, Phase Transition and Fluorescence Sensing Applications

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KEYWORDS: Mn perovskites; Crystals; Phase transition; Coordination; Fluorescence

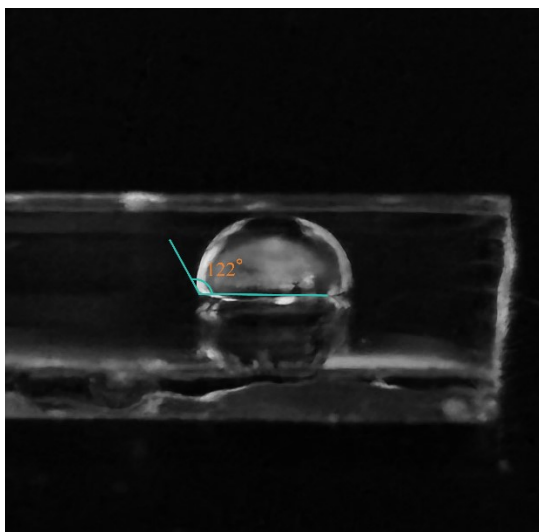


Figure S1. A droplet formed on PDMS coated substrate and the corresponding contact angle.

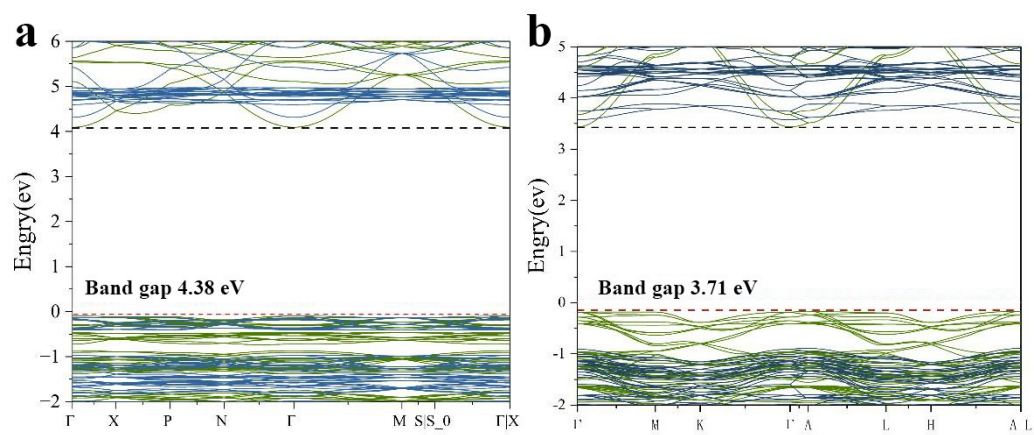


Figure S2. DFT calculations for Cs_3MnCl_5 and CsMnCl_3 crystals. (a) Cs_3MnCl_5 . (b) CsMnCl_3 .

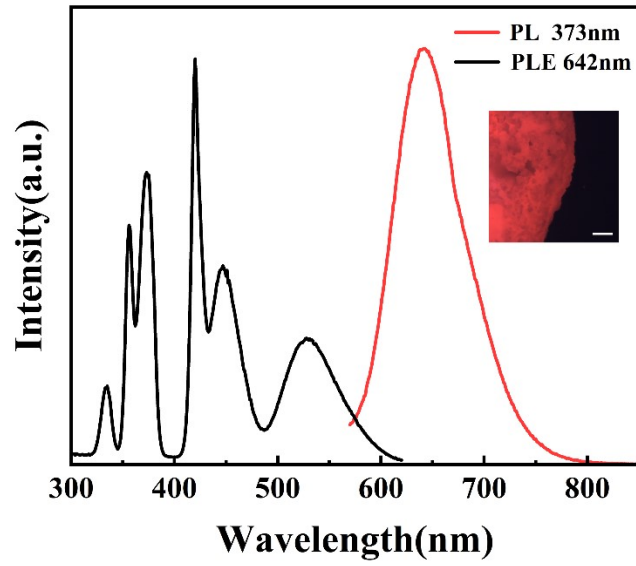


Figure S3. PL and PLE spectra of CsMnCl_3 formed after phase transition of Cs_3MnCl_5 . The inset shows fluorescence microscopy images of the crystal under 365 nm excitation. The scale bar is 50 μm .

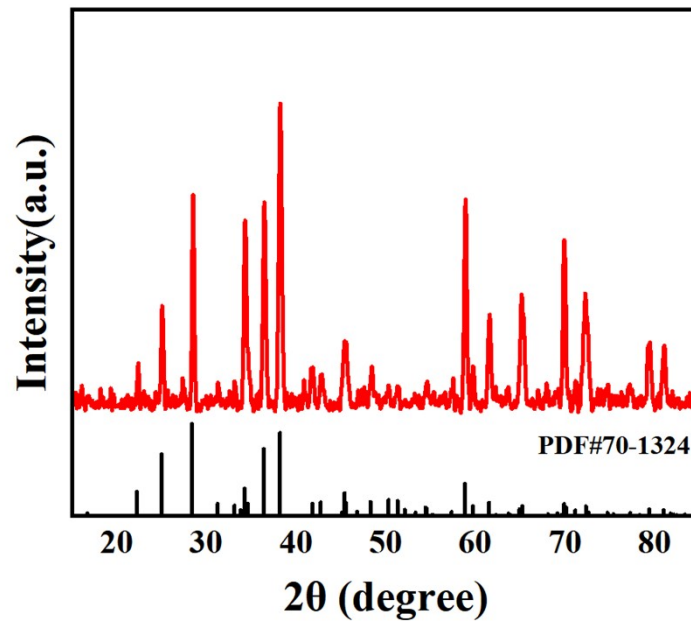


Figure S4. XRD pattern of CsMnCl_3 formed after phase transition of Cs_3MnCl_5 .

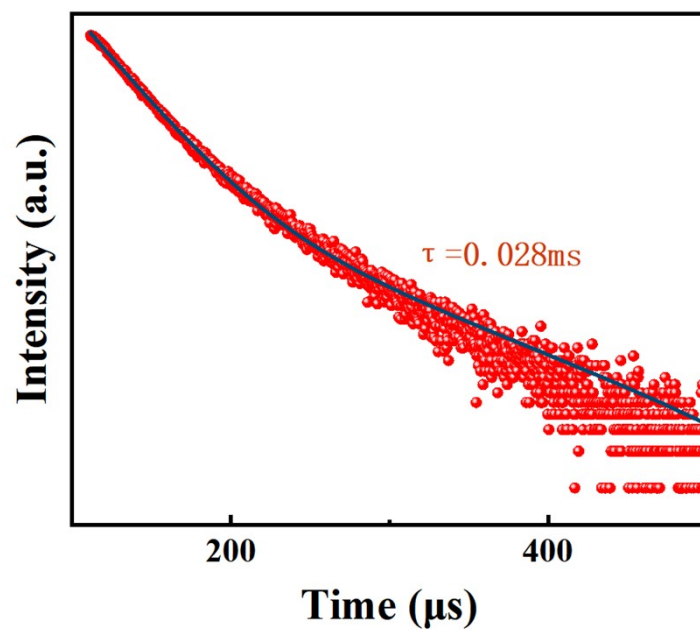


Figure S5. Time-resolved PL spectrum of CsMnCl_3 formed after phase transition of Cs_3MnCl_5 .

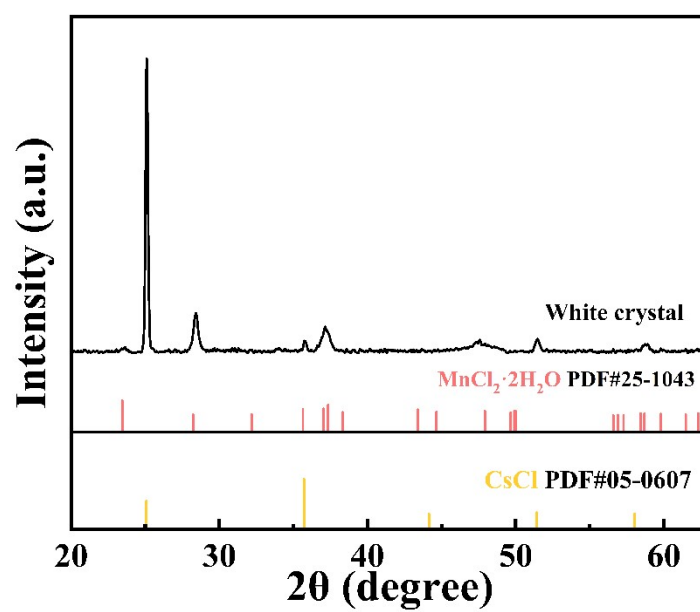


Figure S6. XRD pattern of the non-luminescent white crystal.

Table S1. Comparison of on-chip rapid crystallization and other growth strategies for Mn-based halide perovskites.

Synthetic strategy	Materials	Crystal size/structure	Advantages
Hot-injection ¹	CsPb _{1-x} Mn _x Cl ₃ CsPb _{1-x} Mn _x Br ₃	Monodisperse Mn-doped colloidal nanocrystals	High crystallinity and strong PL
Ligand-assisted reprecipitation ²	MAPb _{1-x} Mn _x Cl ₃ MAPb _{1-x} Mn _x Br ₃	Quantum dots or nanocrystals	Simple and low-cost
Ion exchange ³	CsMn(Cl/Br) ₃	Mn based mixed-halide nanocrystals	Tunable emissions
Mechanical solid-state grinding ⁴	CsPbCl ₃ :Mn CsPb(Cl/Br) ₃ :Mn	Mn doped microcrystals	Green and low-cost
On-chip rapid crystallization	Cs₃MnCl₅ CsMnCl₃	Micrometer sized single crystals	Simple, rapid, and versatile

References

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