

Supplement information

Modulating luminescence properties of CsMnBr₃ based lead-free single crystals by Pseudohalide doping

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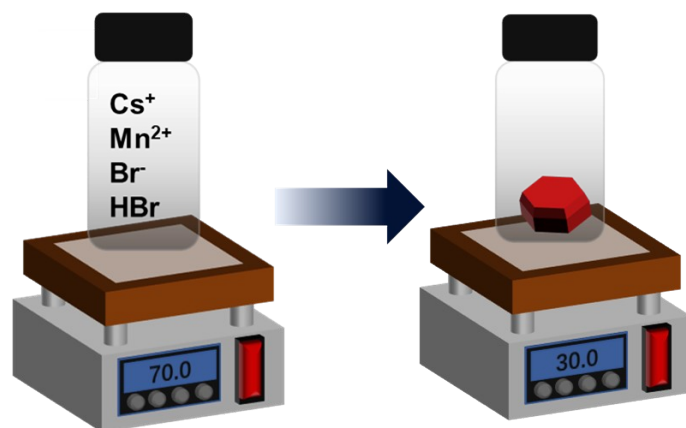


Fig. S1. Schematic diagram of single crystal growth via solution temperature-lowering method.

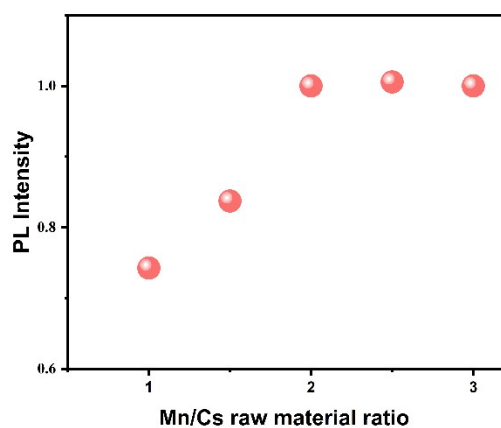


Fig. S2. Emission intensity/Highest emission intensity spectra of $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O} : \text{Ac}^-$ grown at different Mn: Cs ratios.

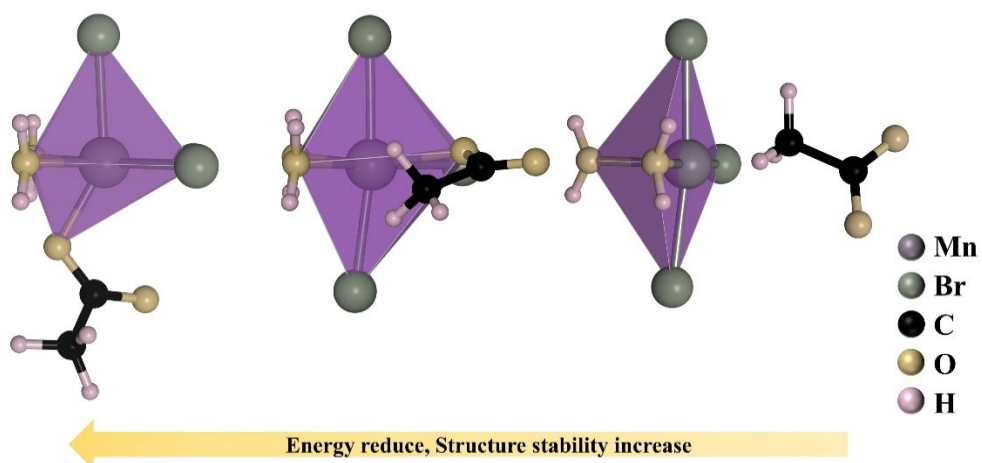


Fig. S3. Possible structure of Ac^- doped position.

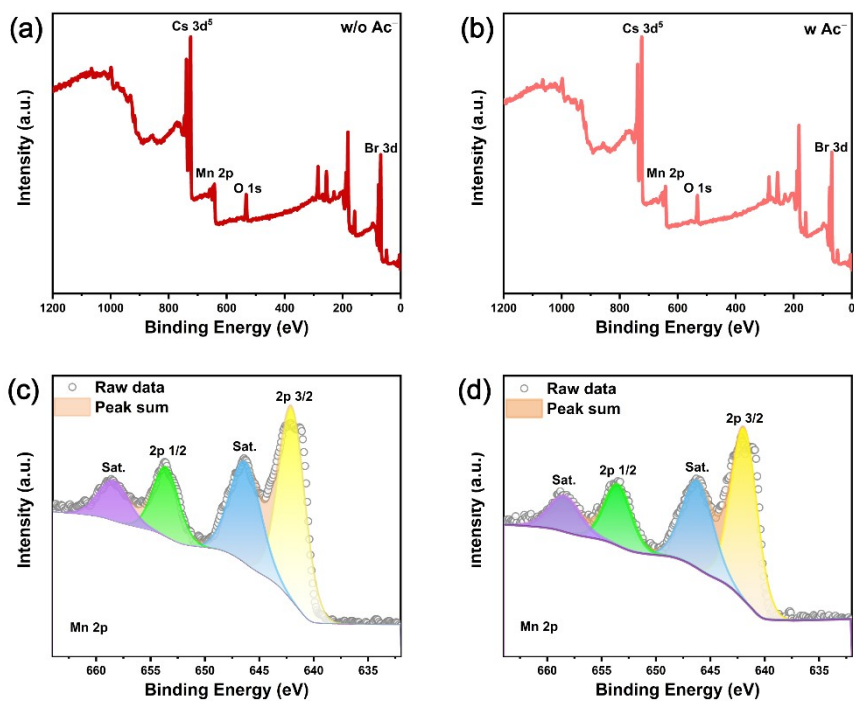


Fig. S4. (a)(b) Full range XPS survey spectrum of CsMnBr₃·2H₂O and CsMnBr₃·2H₂O:Ac⁻; (c)(d) high-resolution Mn 2p XPS spectra.

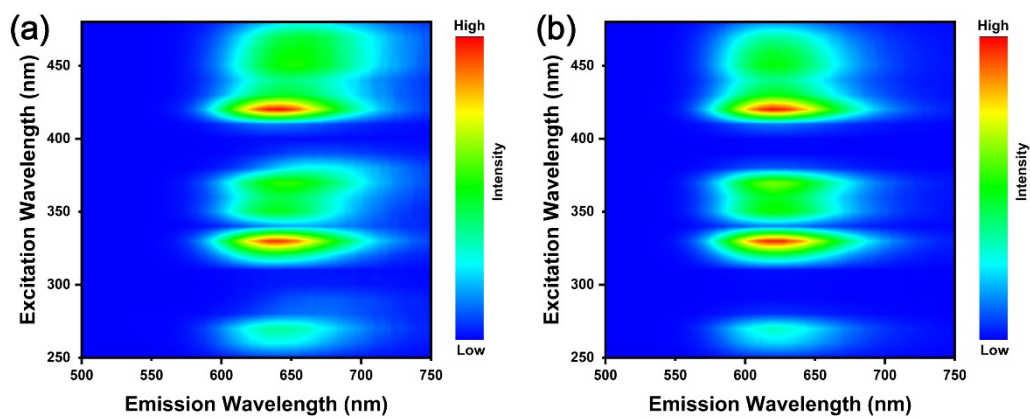


Fig. S5. (a)(b) Emission-excitation color maps of CsMnBr₃·2H₂O and CsMnBr₃·2H₂O:Ac⁻.

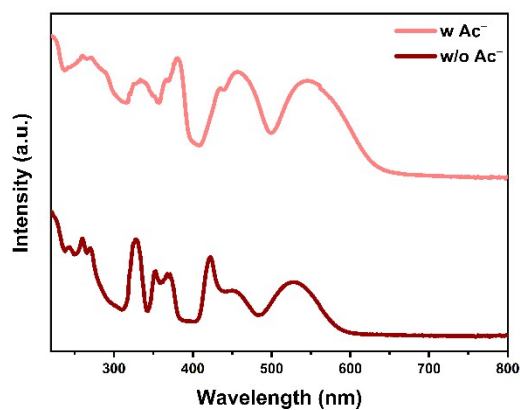


Fig. S6. UV-vis absorption spectra of $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O}$ single crystal and $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O} : \text{Ac}^-$ single crystal.

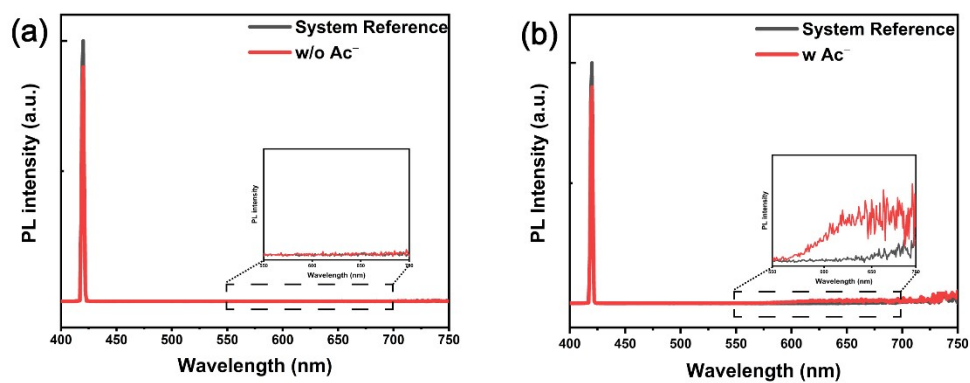


Fig. S7. (a)(b) PLQY measurements of $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O}$ and $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O} : \text{Ac}^-$ single crystal at room temperature.

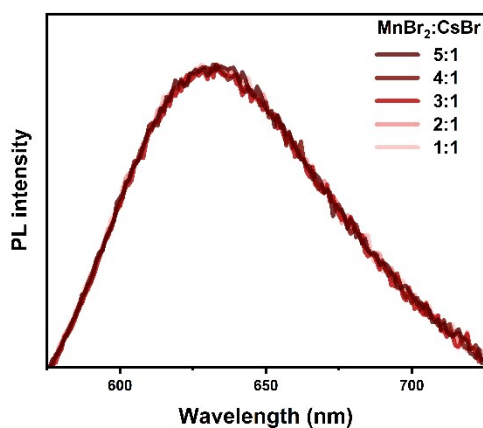


Fig. S8. PL emission spectra of $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O}$ grown at different $\text{MnBr}_2 : \text{CsBr}$ ratios.

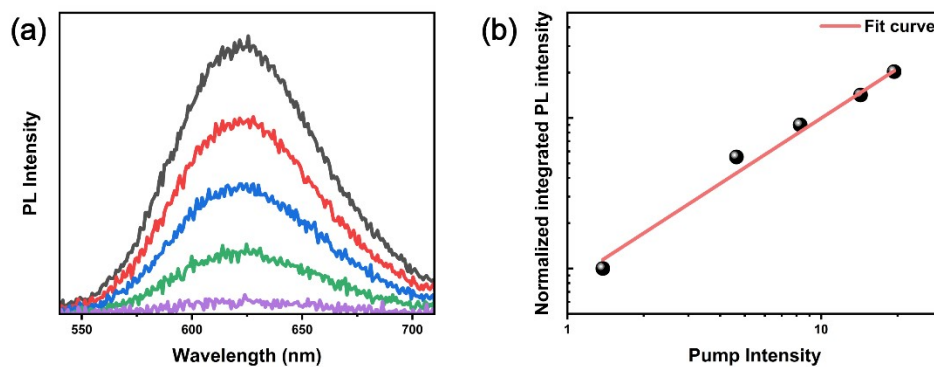


Fig. S9. (a)(b) The excitation power-dependent PL spectra of the $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O} : \text{Ac}^-$ sample and the picture are the integrated intensity of peaks with the change of excitation power; the solid lines are theoretical fitting curves.

No.	concentration(mg/100g)
1	4.142
2	4.272
3	4.043
Average	4.152

Table. S1 Acetate ion concentration and the average value obtained by HPIC, the unit is mg Ac^-/g $\text{CsMnBr}_3 \cdot 2\text{H}_2\text{O} : \text{Ac}^-$ single crystals.