

Supporting Information

Yb³⁺ and Yb³⁺/Er³⁺ Doping for Near-Infrared Emission and Improved Stability of CsPbCl₃ Nanocrystals

Xiangtong Zhang¹, Yu Zhang^{1,*}, Xiaoyu Zhang², Wenxu Yin¹, Yu Wang¹, Hua Wang³, Min Lu¹, Zhiyang Li⁴, Zhiyong Gu⁴, William W. Yu^{1,3,*}

¹ State Key Laboratory of Integrated Optoelectronics and College of Electronic Science and Engineering, Jilin University, Changchun, 130012, China

² School of Materials Science & Engineering, Jilin University, Changchun 130012, China

³ Department of Chemistry and Physics, Louisiana State University, Shreveport, LA 71115, USA

⁴ Department of Chemical Engineering, University of Massachusetts Lowell, Lowell, MA 01854

Corresponding authors:

yuzhang@jlu.edu.cn (Y. Zhang)

wyu6000@gmail.com (W. W. Yu)

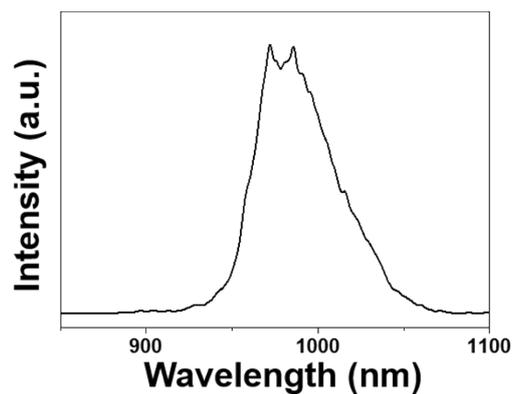


Figure S1. NIR emission spectrum of $\text{CsPbCl}_3:\text{Yb}^{3+}$ NCs by a high-resolution spectrometer.

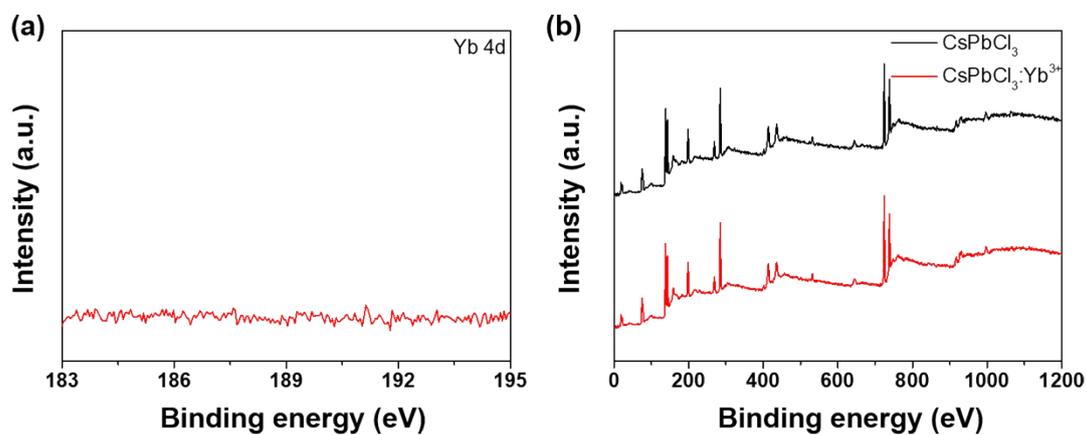


Figure S2. (a) High resolution XPS spectrum of $\text{CsPbCl}_3:\text{Yb}^{3+}$ NCs. (b) XPS spectra of undoped and doped CsPbCl_3 NCs.

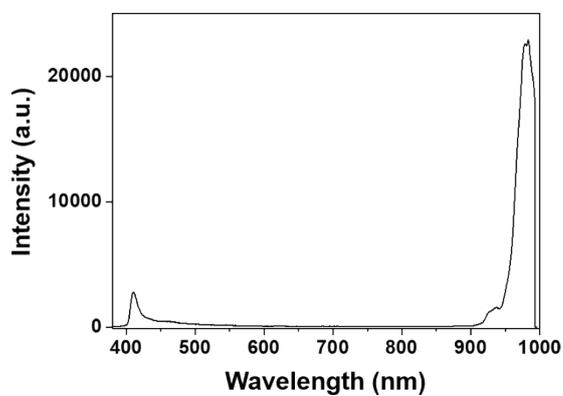


Figure S3. Full emission spectrum.

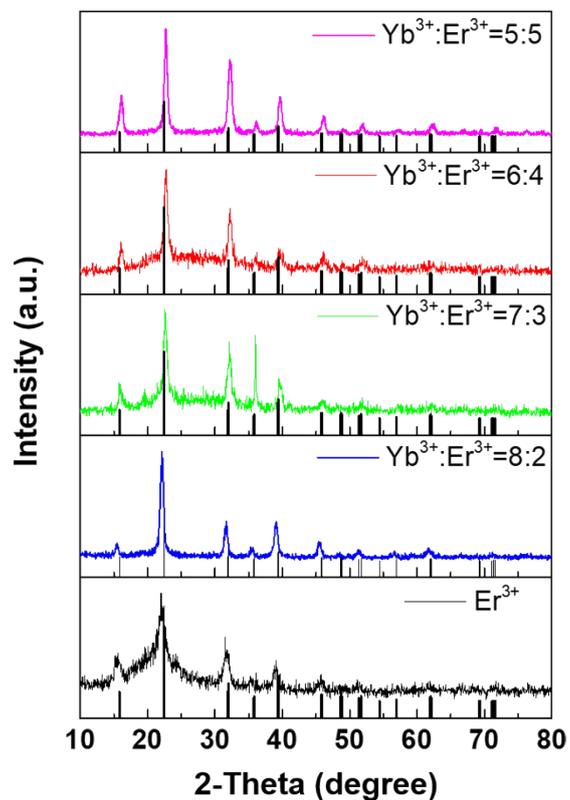


Figure S4. XRD characterizations for CsPbCl₃ and doped NCs synthesized at 260°C.

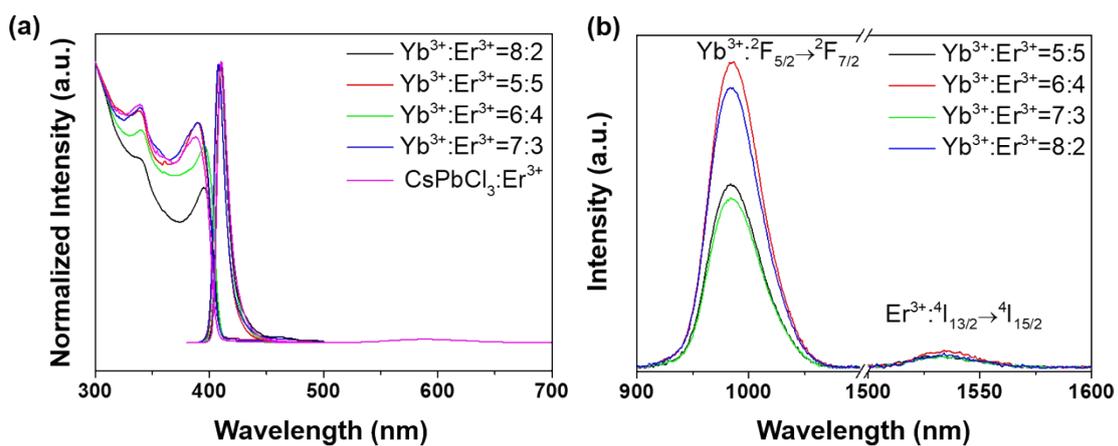


Figure S5. (a) Absorption and visible emission spectra of CsPbCl₃ and doped NCs. (b) NIR emission spectra of CsPbCl₃:Yb³⁺/Er³⁺ NCs excited at 365 nm.

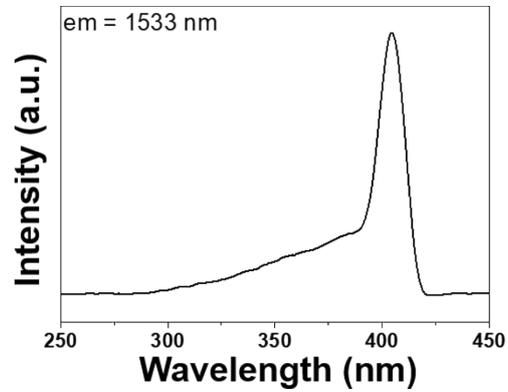


Figure S6. Excitation spectrum of CsPbCl₃:Er³⁺/Yb³⁺ NCs monitored at 1533 nm.

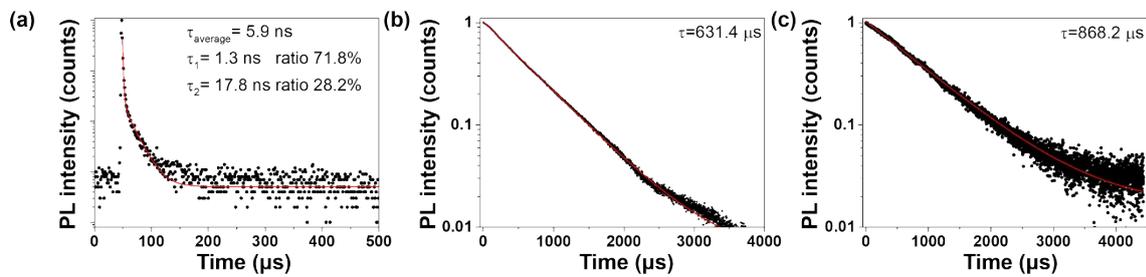


Figure S7. (a) Time-resolved band edge emission decay profiles of CsPbCl₃:Yb³⁺/Er³⁺ NCs fitted by a double-exponential function. (b) Time-resolved PL decay curve of ²F_{5/2}→²F_{7/2} of Yb³⁺ ions in CsPbCl₃:Yb³⁺/Er³⁺ NCs fitted by a single-exponential function. (c) Time-resolved PL decay profile of ⁴I_{13/2}→⁴I_{15/2} of Er³⁺ ions in CsPbCl₃:Yb³⁺/Er³⁺ NCs fitted by a single-exponential function.