

## Supporting Information

# Fine control of Ce doped $\text{CH}_3\text{NH}_3\text{PbBr}_3$ to modulate photoluminescence and carrier characteristics for application in photoconductive photodetector

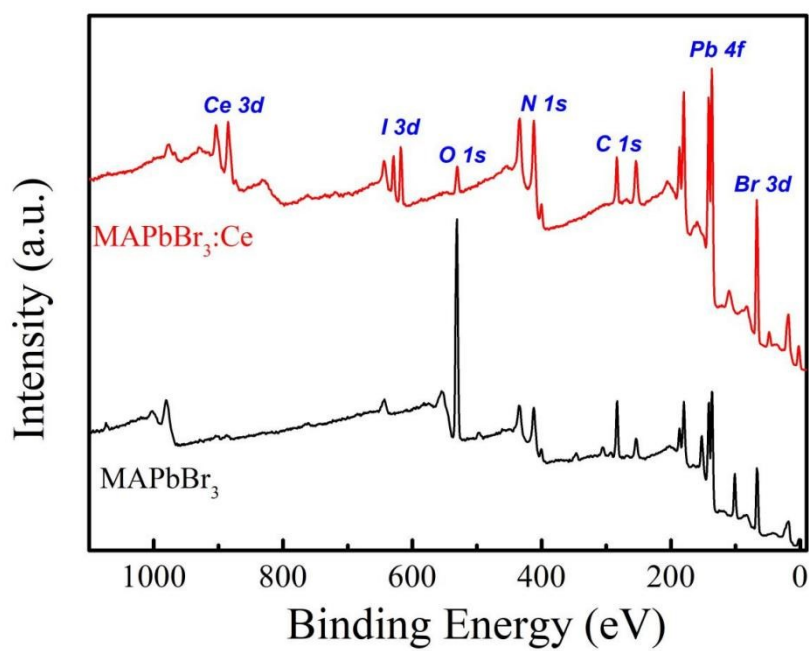
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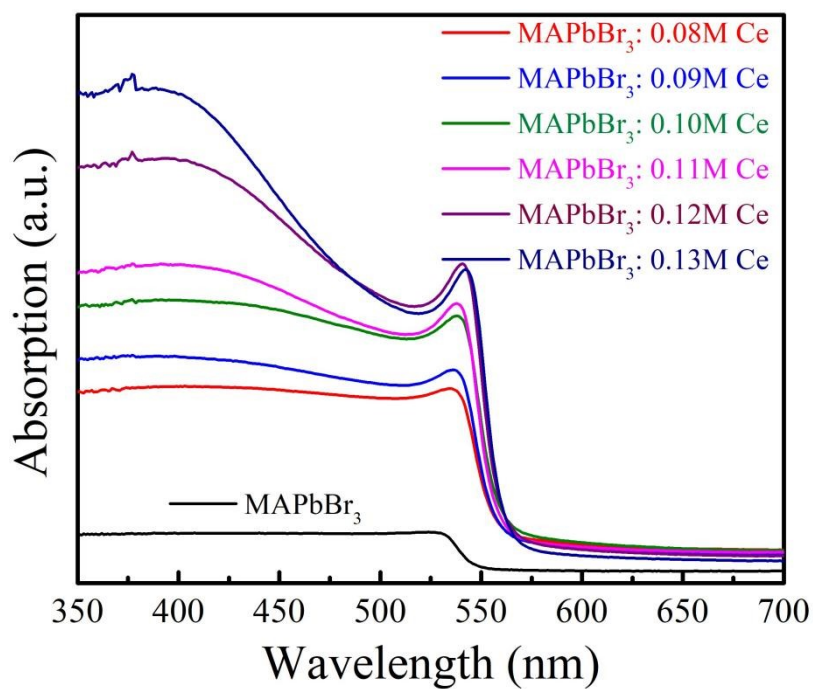
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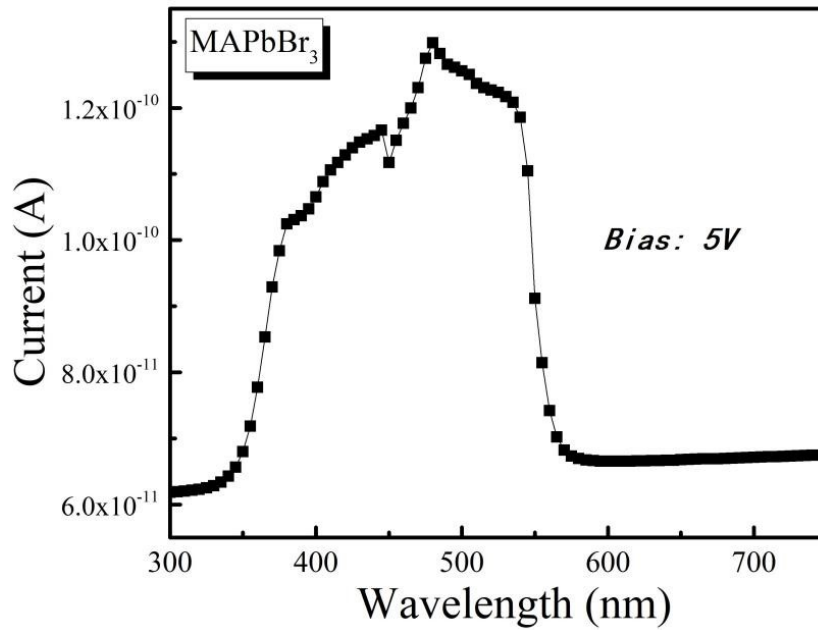
**Figure S1.** XPS spectra of MAPbBr<sub>3</sub> and MAPbBr<sub>3</sub>:Ce films.



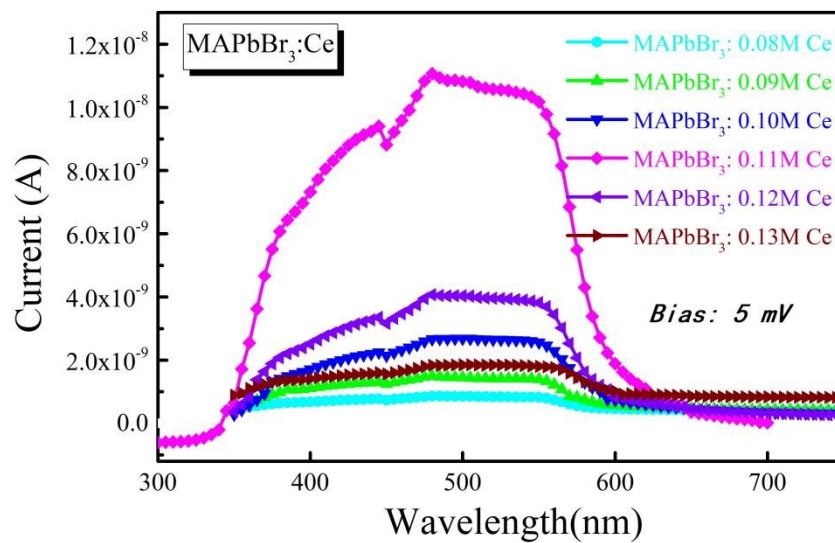
**Figure S2.** Absorption spectra of pristine MAPbBr<sub>3</sub> and MAPbBr<sub>3</sub>:Ce films.

**Table S1.** The measured parameters of PL lifetime. (No. 0, 0.08, 0.09, 0.10, 0.11, 0.12 and 0.13 represent the samples of MAPbBr<sub>3</sub>, MAPbBr<sub>3</sub>:0.08M Ce, MAPbBr<sub>3</sub>:0.09M Ce, MAPbBr<sub>3</sub>:0.10M Ce, MAPbBr<sub>3</sub>:0.11M Ce, MAPbBr<sub>3</sub>:0.12M Ce and MAPbBr<sub>3</sub>:0.13M Ce, respectively).

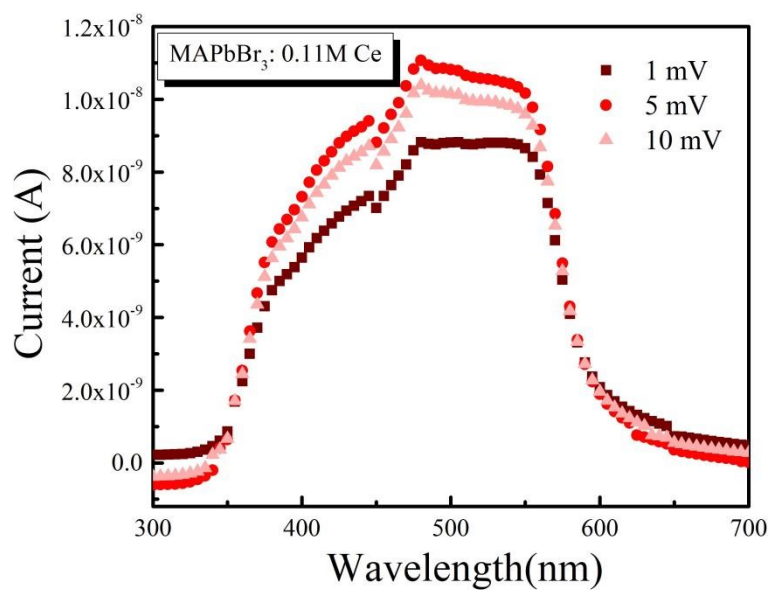
Sample/ Parameter	0	0.08	0.09	0.10	0.11	0.12	0.13
A <sub>1</sub>	6284.321	5433.825	6980.758	7111.302	5833.148	4996.553	1423.611
τ <sub>1</sub>	0.27457	0.11027	1.44529	1.85004	2.5477	3.06121	0.21214
A <sub>2</sub>	4060.192	4236.543	3256.217	12639.8	4000.897	4363.25	8628.462
τ <sub>2</sub>	1.15137	1.03505	0.50859	0.03052	7.63663	3.06109	1.57833
A <sub>3</sub>	492.63	967.2116	636.3093	932.1124	230.6576	937.315	1742.004
τ <sub>3</sub>	4.3409	4.27751	4.71459	6.02656	54.00498	9.80396	4.82135
τ <sub>avg</sub>	1.772981	2.444994	2.00523	3.037938	16.31051	4.698584	2.780197



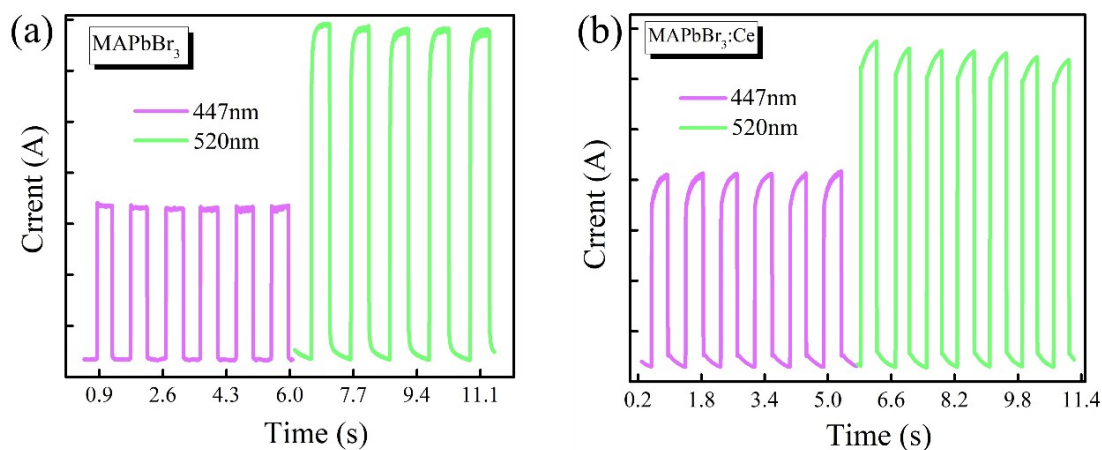
**Figure S3.** The photocurrent vs. wavelength for MAPbBr<sub>3</sub> based device under the bias voltage of 5 V.



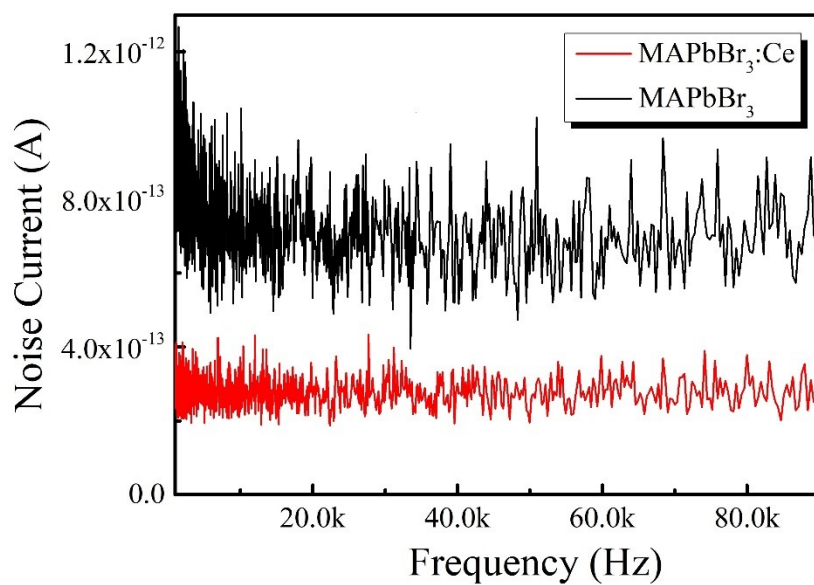
**Figure S4.** The photocurrent vs. wavelength for MAPbBr<sub>3</sub>:Ce based devices under the bias voltage of 5 mV.



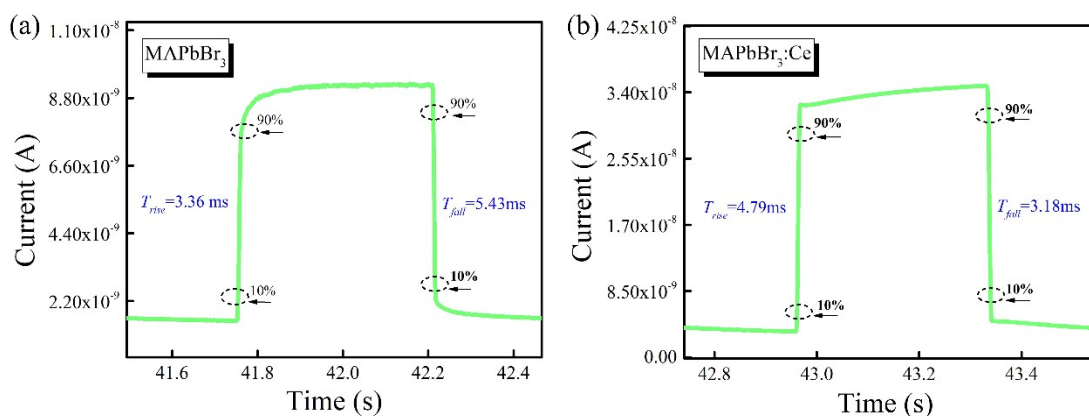
**Figure S5.** The photocurrent vs. wavelength for MAPbBr<sub>3</sub>:0.11M Ce based device under different bias voltage.



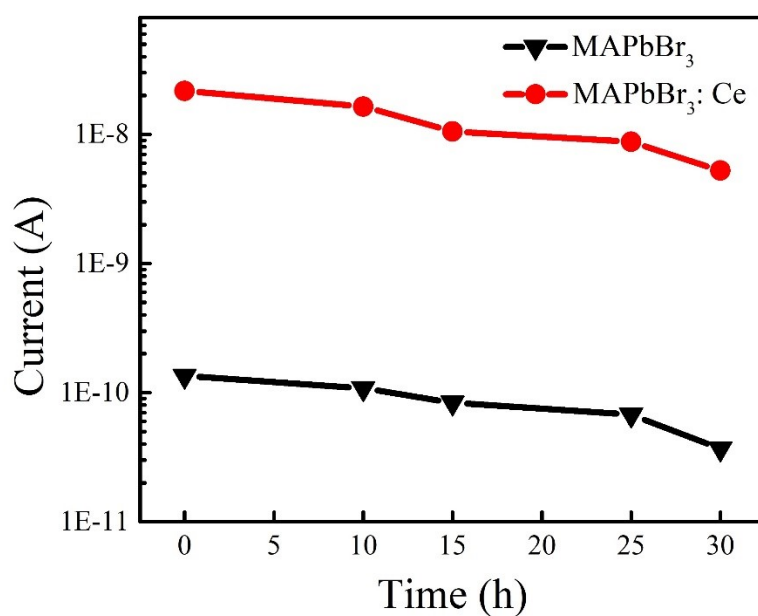
**Figure S6.** The on-off curves for (a) MAPbBr<sub>3</sub> and (b) MAPbBr<sub>3</sub>:0.11M Ce based device under different excitation wavelength.



**Figure S7.** The frequency dependent noise current for MAPbBr<sub>3</sub> and MAPbBr<sub>3</sub>:Ce based devices, respectively.



**Figure S8.** The responsive time for (a) MAPbBr<sub>3</sub> and (b) MAPbBr<sub>3</sub>:0.11M Ce based device under 520 nm light illumination.



**Figure S9.** The stability of MAPbBr<sub>3</sub> and MAPbBr<sub>3</sub>:Ce based devices under 520 nm light illumination.