

Supplementary Materials: Emission Enhancement and Intermittency in Polycrystalline Organolead Halide Perovskite Films

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1. Device Structure

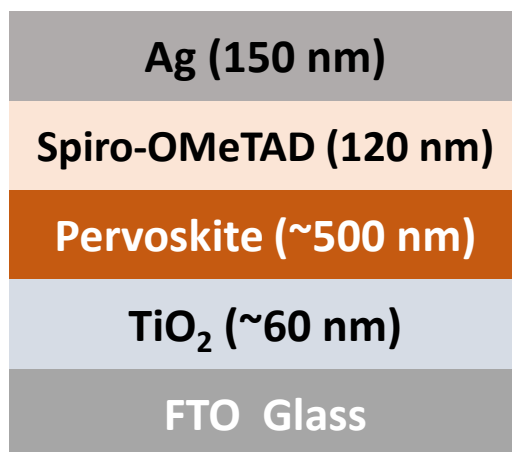


Figure S1. The schematic diagram of a typical perovskite solar cell.

2. Evolution of Photoluminescence at Different Excitation Intensities

A pure perovskite film on glass (like in Figure 3) was measured under low (44 mW/cm², Figure S2a,c) and higher excitation intensity (280 mW/cm²; Figure S2b,d). Both curves were fitted by a bi-exponential function, showing a much faster increase process with time constants of 4 s and 120 s at the higher excitation intensity.

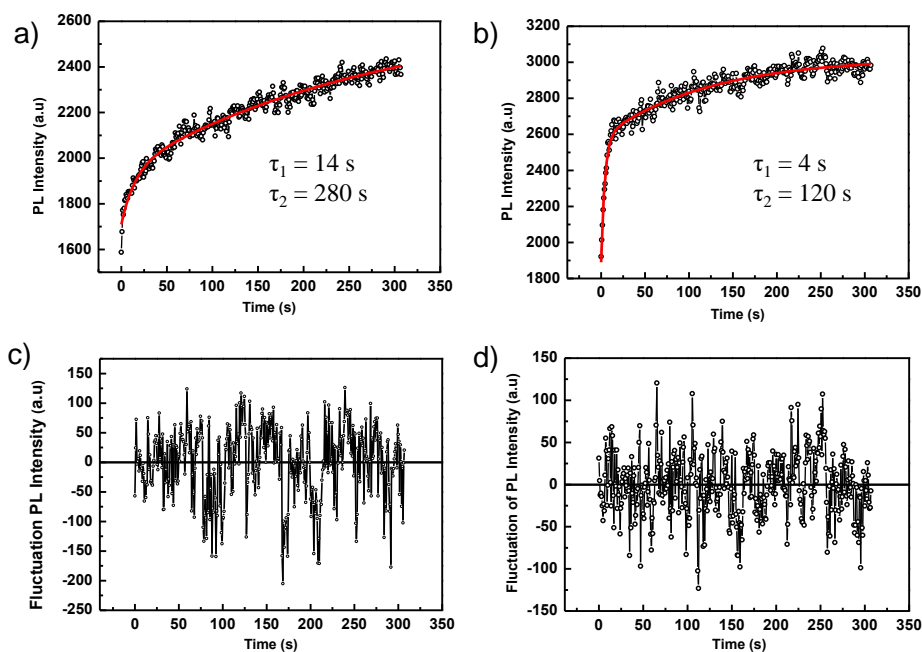


Figure S2. Comparison of PL intensity trajectory extracted from the same device in the sequence of images with excitation intensities of (a) 44 mW/cm² and (b) 280 mW/cm², respectively. The red lines are the corresponding bi-exponential fits; (c,d) are the fluctuation of the PL intensity under excitation intensities of 44 mW/cm² and 280 mW/cm², respectively.

3. Blinking in Detail

A video file is available for download, showing the PL intermittency in the pristine $\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x$ perovskite film (excitation intensity 44 mW/cm^2). The sequence is played 1.4x faster than real time. The diameter of the illumination spot is $\sim 60 \mu\text{m}$.

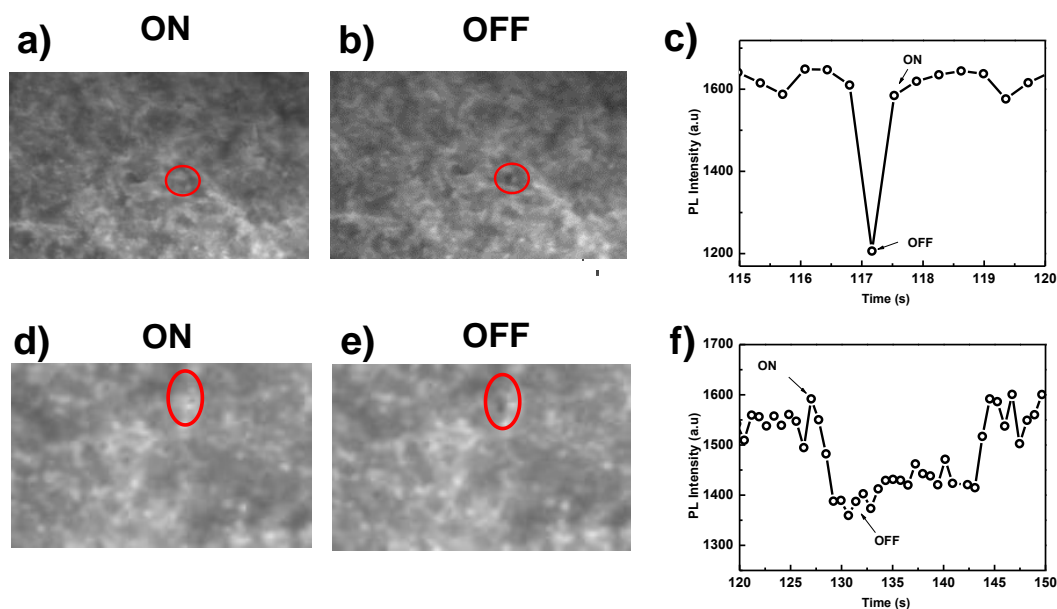


Figure S3. Different grains with PL blinking behaviors. (a) to (c) are one single grain with short OFF states; (d) to (f) are one single grain with longer OFF states.

4. Photoluminescence Quantum Efficiency

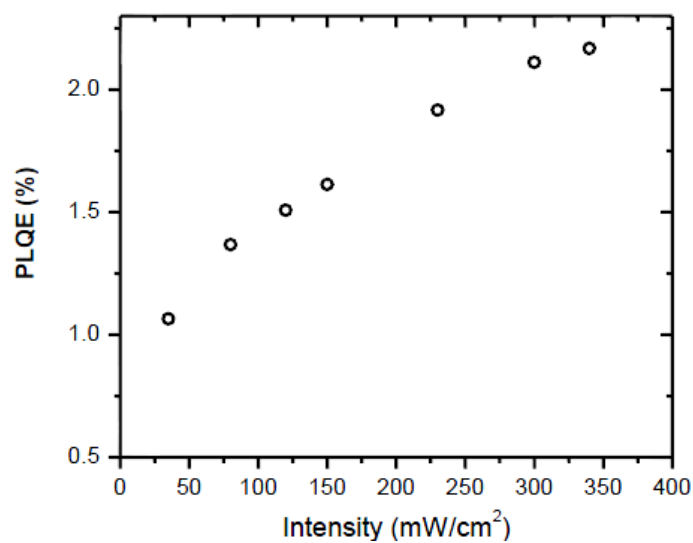


Figure S4. PLQE measurement of the perovskite/PCBM device, which exhibits PL quenching compared to the one without the PCBM quencher layer.