Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Air-Stable Formamidinium/Methylammonium Mixed Lead Iodide Perovskite Integral Microcrystals with a Low Trap Density and High Photo-Responsivity

By *Guangbao Wu, Jiyu Zhou, Rui Meng, Baoda Xue, Huiqiong Zhou, and Zhiyong Tang, Yuan Zhang,**

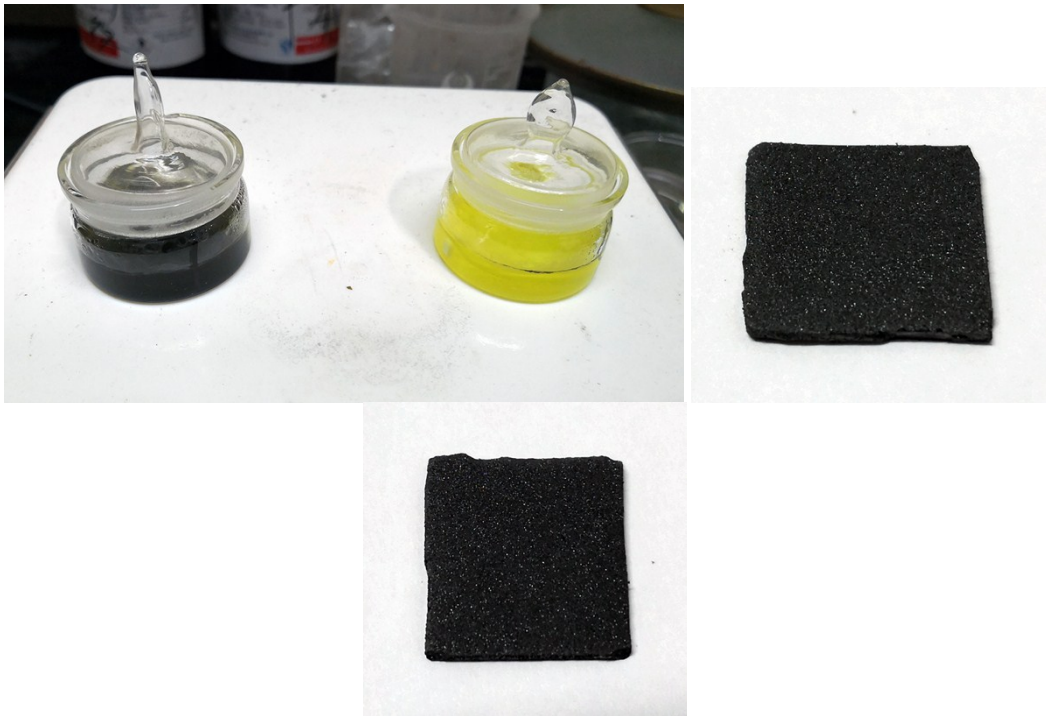

Figure S1. Photos of IMCs grown in solutions at 120℃ and corresponding IMC thin films after thermal annealing. left: $FAPbI_3)_{0.85}(MAPbBr_3)_{0.15}$, right: $FAPbI_3$.

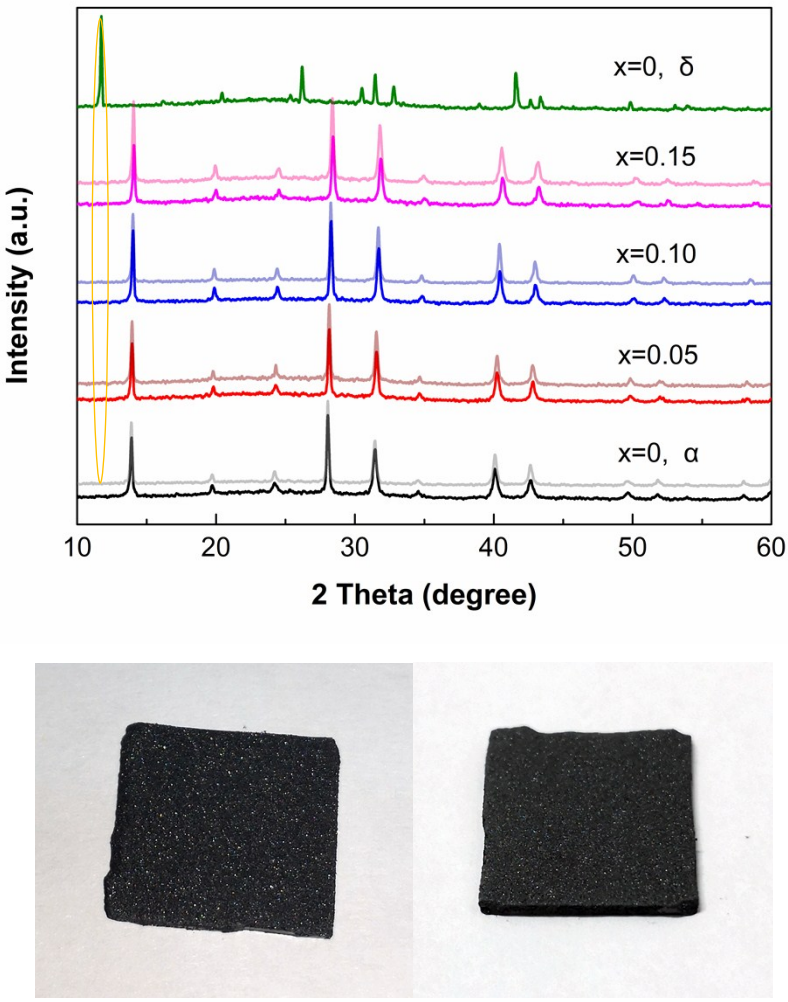

Figure S2. Powder X-ray diffraction patterns (upper graph) (dark color curves represent for the pristine IMCs and light color curves represent for the IMCs exposed to the air for 30 days) and the optical images (low graphs) of IMCs after explosion to air for 30 days (Left is $(FAPbI_3)_{0.85}(MAPbBr_3)_{0.15}$ and right is $FAPbI_3$).

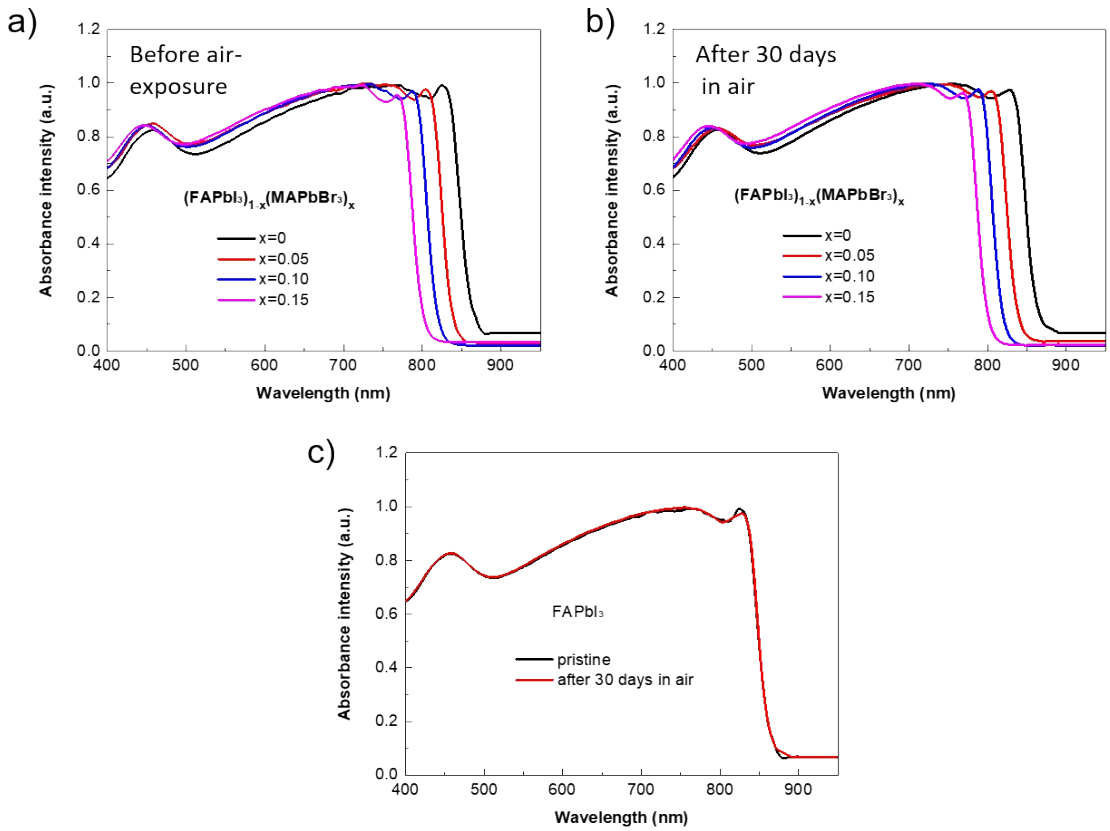

Figure S3. UV-Vis-NIR absorption spectra of (a) fresh and (b) 30-day air-exposed $(FAPbI_3)_{1-x}(MAPbBr_3)_x$ IMCs. (c) Comparison of absorption spectra of $FAPbI_3$ IMCs before and after air-exposure for 30 days.

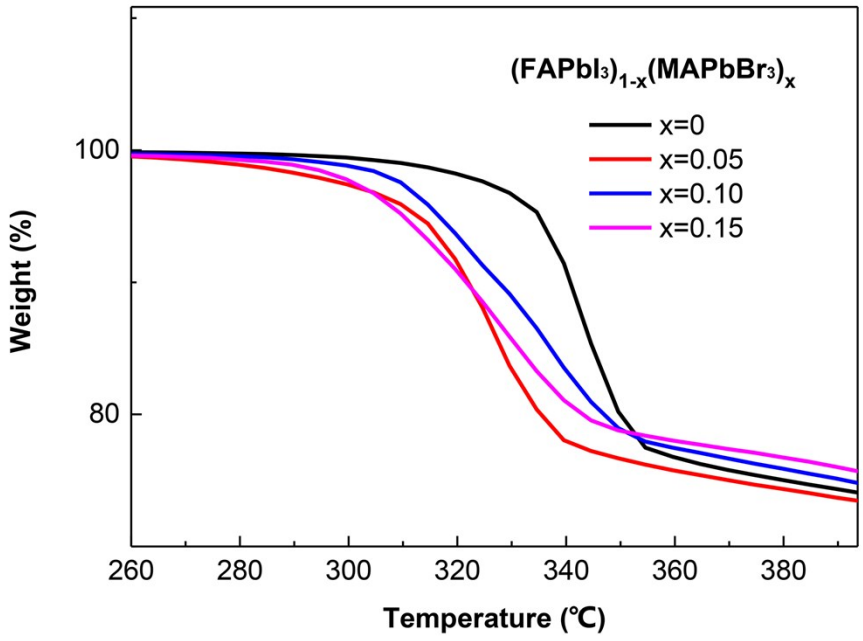

Figure S4. Thermogravimetric analysis of $(FAPbI_3)_{1-x}(MAPbBr_3)_x$ IMCs.

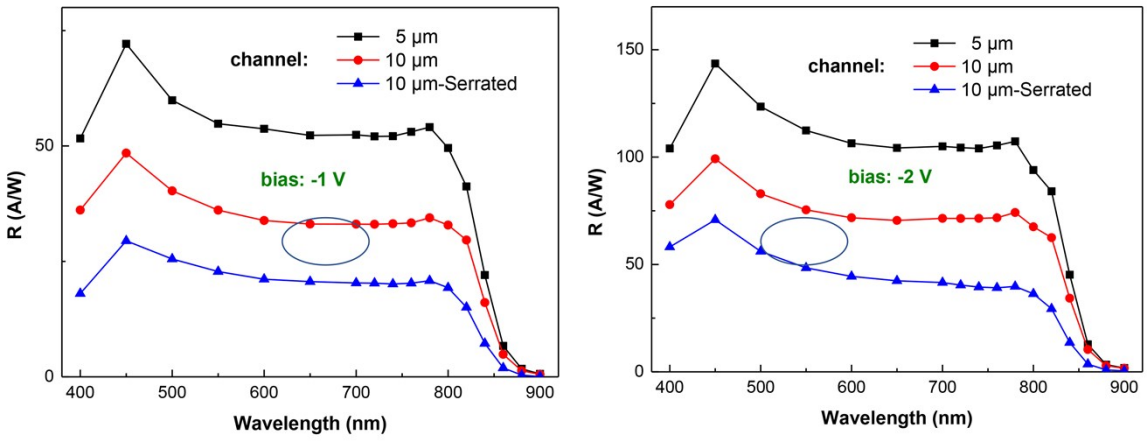

Figure S5. Spectral response of planar diodes containing differnt channel disctances based on the photoactive layers of IMCs under bias of (left) -1 V and (right) -2 V.

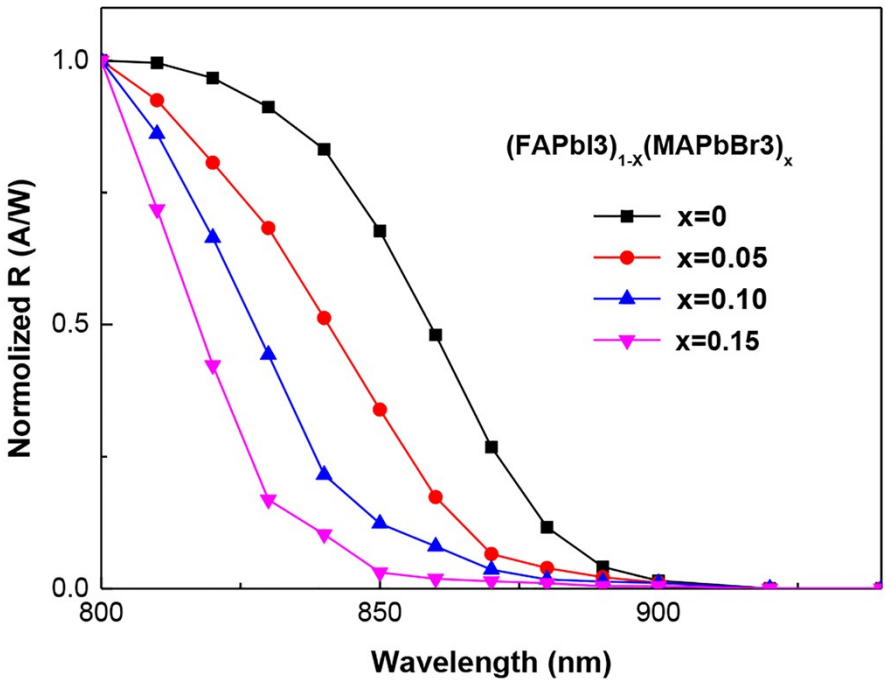

Figure S6. Absorption edge of light response of $(FAPbI_3)_{1-x}(MAPbBr_3)_x$ planar diodes with different concentrations of $MAPbBr_3$.

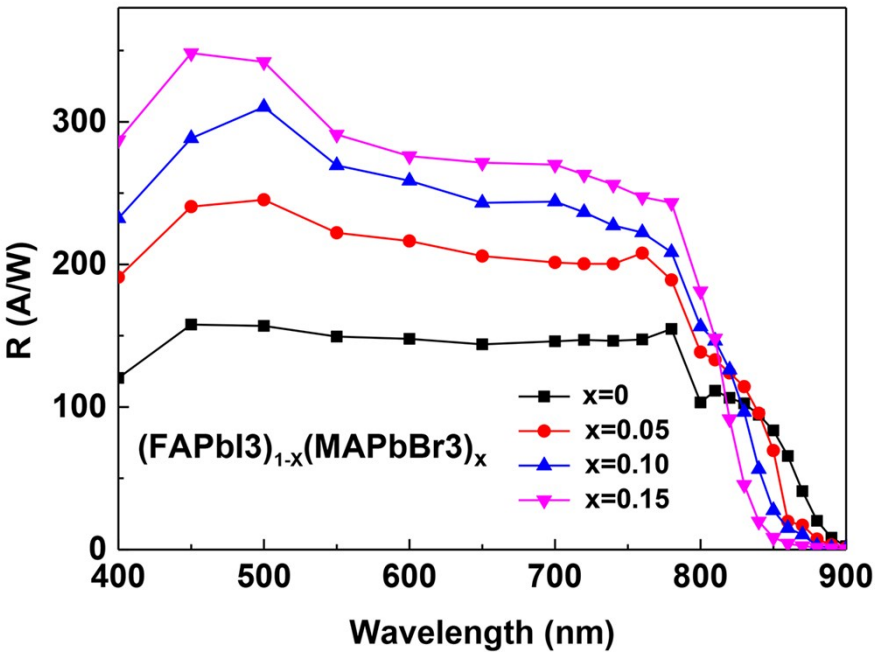

Figure S7. Photoresponse of $(FAPbI_3)_{1-x}(MAPbBr_3)_x$ diodes after air-storage for 1 week.

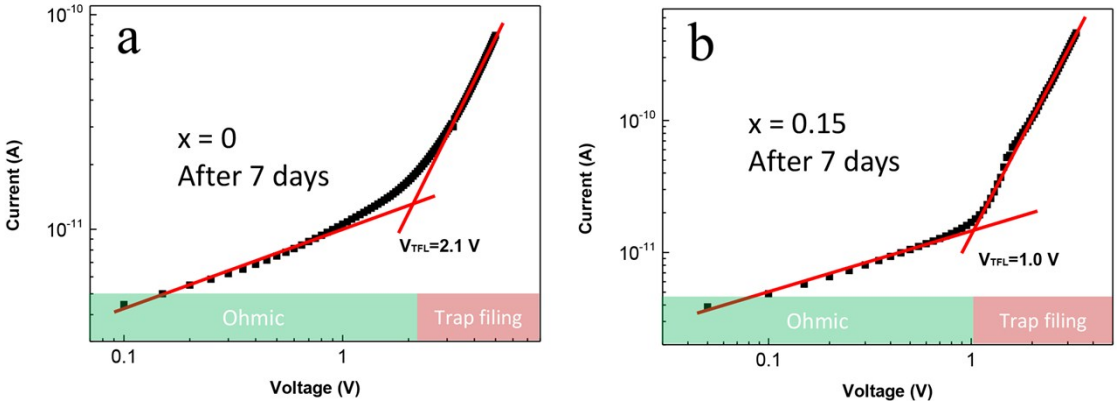

Figure S8. Dark current vs. voltage characteristics of planar diodes with different concentrations of $MAPbBr_3$ upon air-exposure for 1 week.

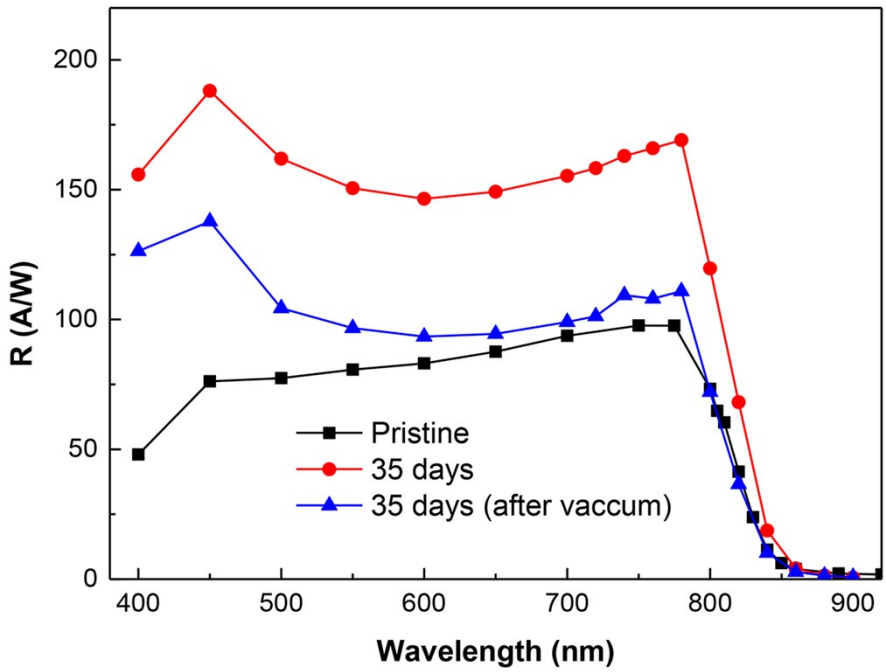

Figure S9. Compared photoresponses *R* of planar diodes based on $(FAPbI_3)_{1-x}(MAPbBr_3)_x$ (x = 0.15) IMCs with different treatments.

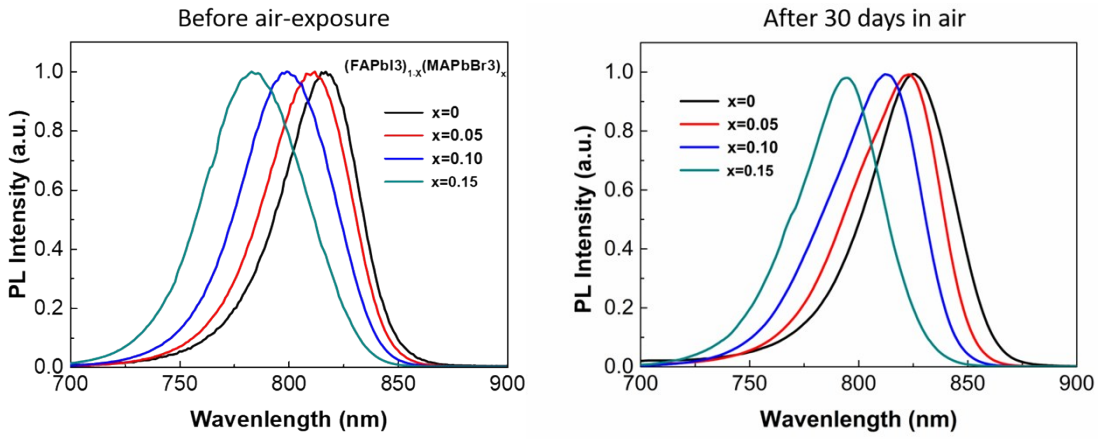

Figure S10. Steady-state photoluminescence (PL) spectra of fresh (left) and 30 days air-exposed (right) $(FAPbI_3)_{1-x}$ $(MAPbBr_3)_x$ IMCs prepared silica substrates.