Electronic Supplementary Information

Sensitively switchable visible/infrared multispectral detection and imaging based on tandem perovskite device

Jiaxin Liu,[+a] Yousheng Zou,[+a] Bo Huang,[a] Yu Gu,[a] Yan Yang,[a] Zeyao Han,[a] Yuanzhou Zhang,[a] Xiaobao Xu*[a] and Haibo Zeng*[a]

Key Laboratory of Advanced Display Materials and Devices, Ministry of Industry and Information Technology, Institute of Optoelectronics & Nanomaterials, School of Material Science and Engineering, Nanjing University of Science and Technology, Nanjing, 210094 China

[+]These authors contributed equally
Corresponding E-mail: xiaobaoxu@njust.edu.cn (X. X) zeng.haibo@njust.edu.cn (H, Z)

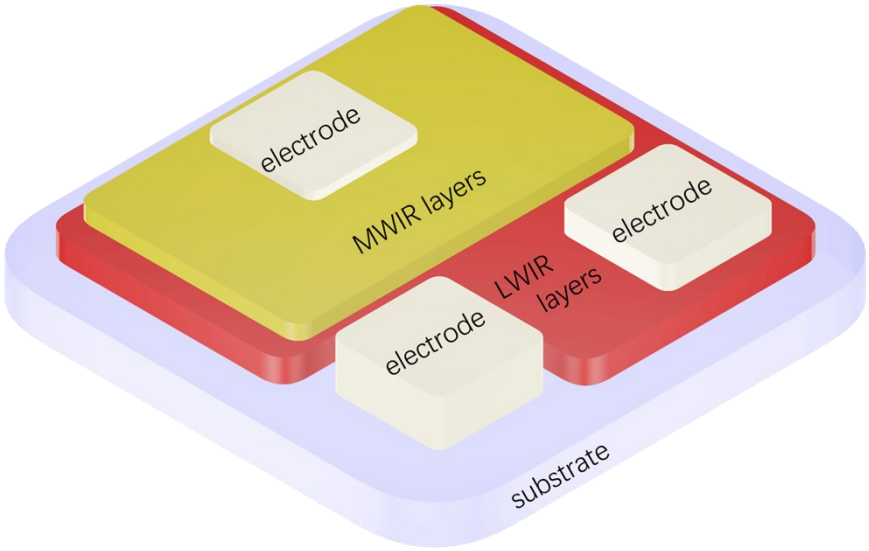

Figure S1. The schematic diagram of type-II superlattices multicolor photodetectors with three electrical contacts.[1, 2]

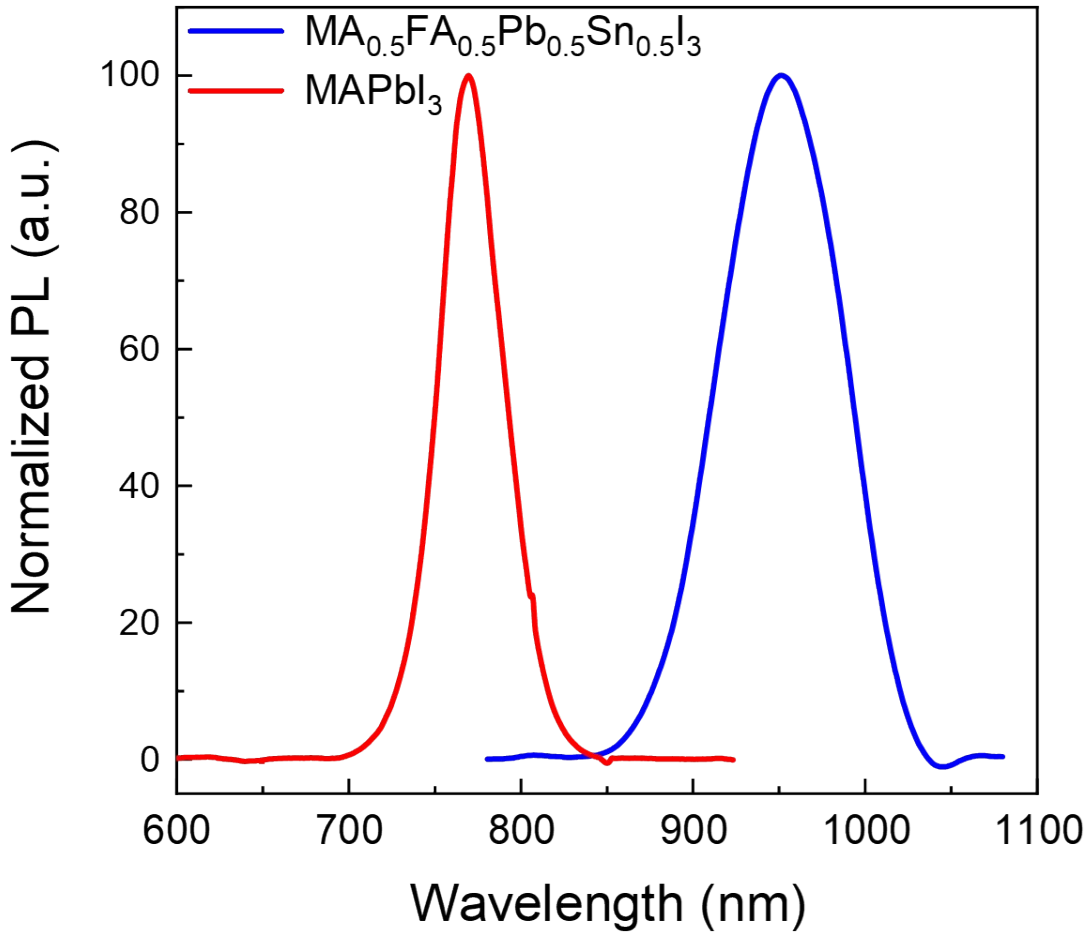

Figure S2. The photoluminescence (PL) spectrum of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ films.

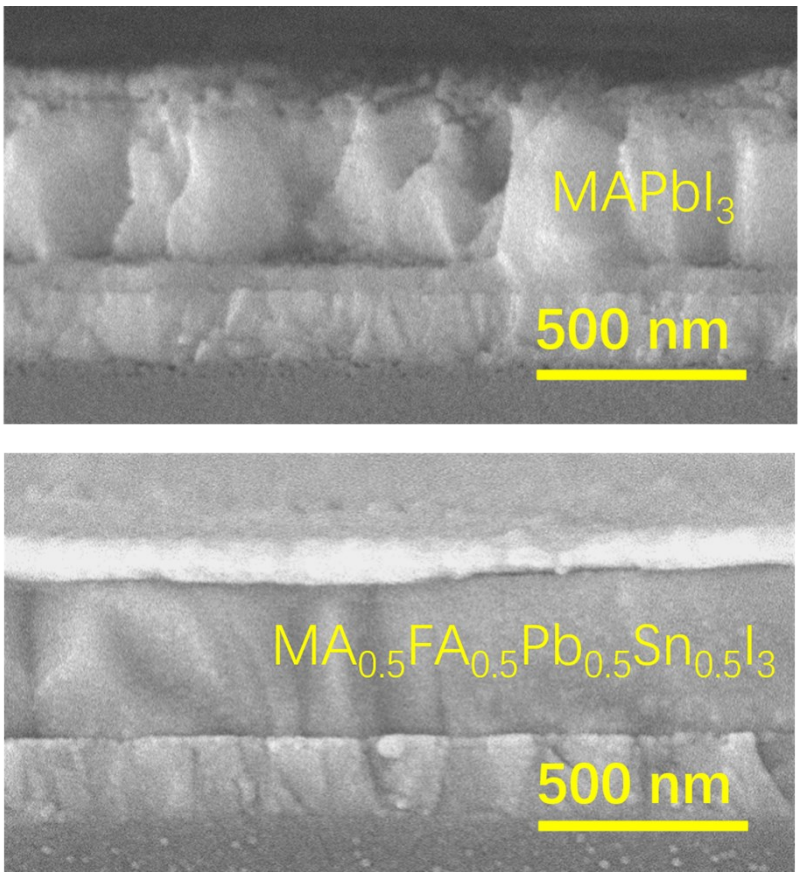

Figure S3. The cross-sectional SEM images of $MAPbI_3$- and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$-based single-spectral PDs.

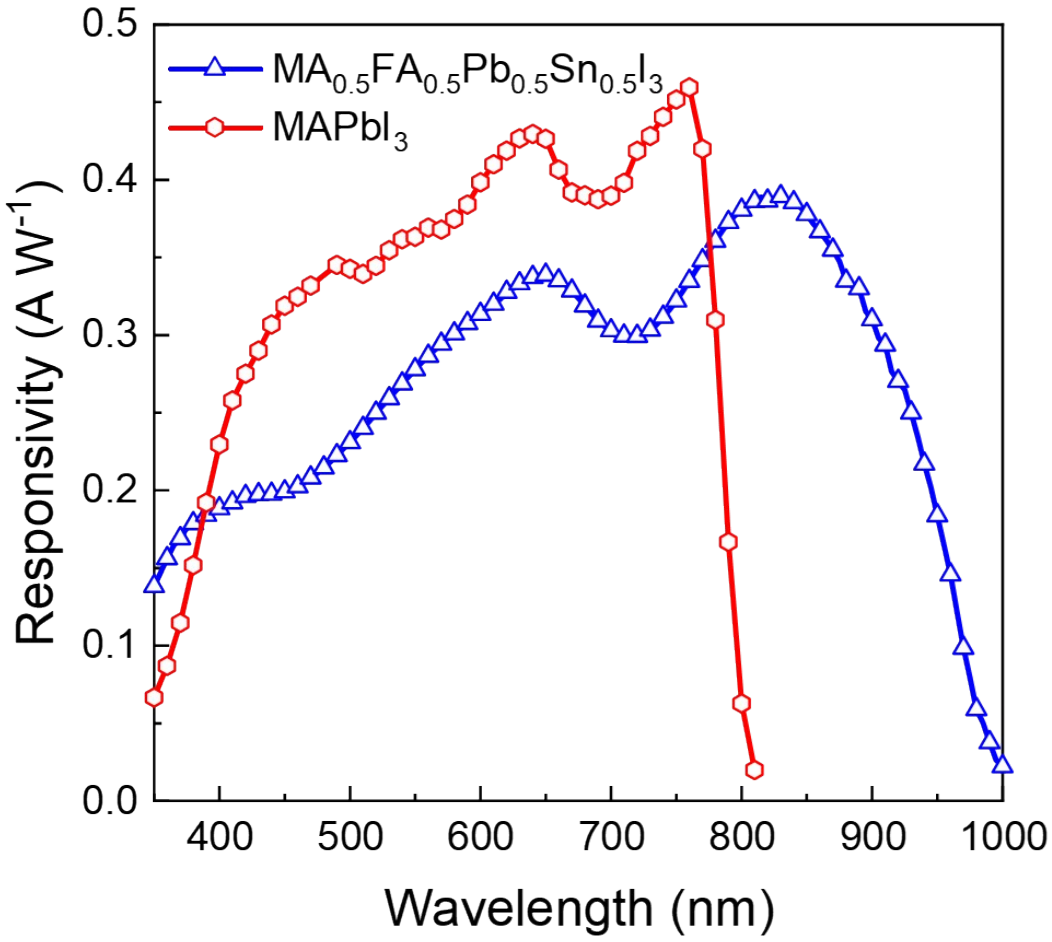

Figure S4. The responsivity curves of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ PDs.

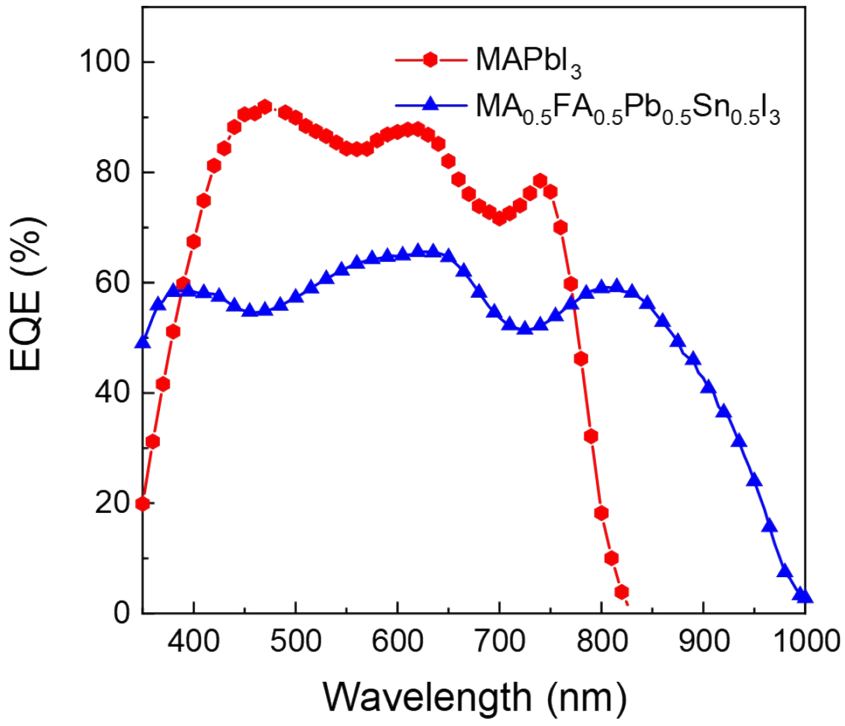

Figure S5. The EQE curves of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ PDs.

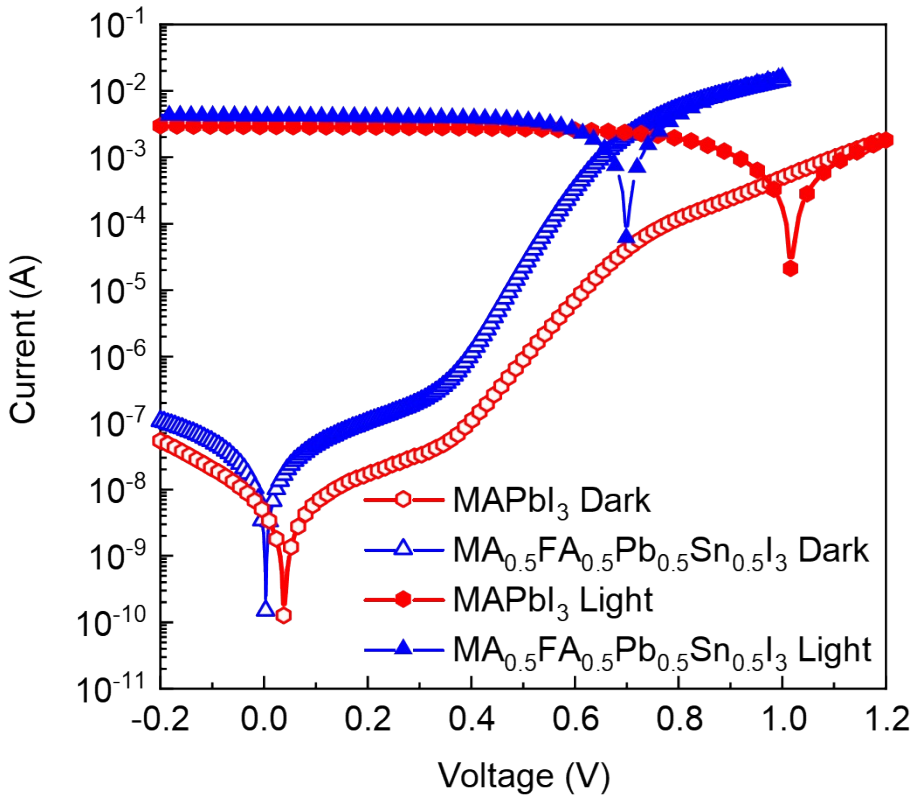

Figure S6. The *I–V* characteristics of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ PDs under 1 sun illumination (100 mW cm^{-2}, AM 1.5) and in dark.

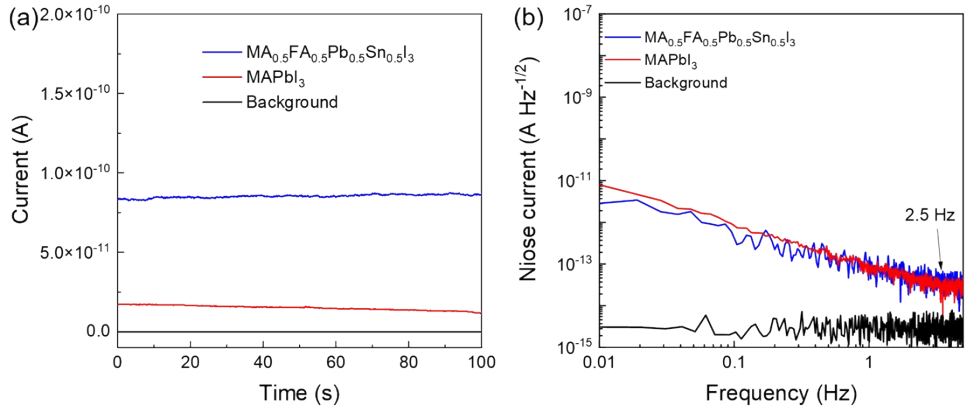

Figure S7. The dark current (a) and the calculated noise current (b) of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ PDs.

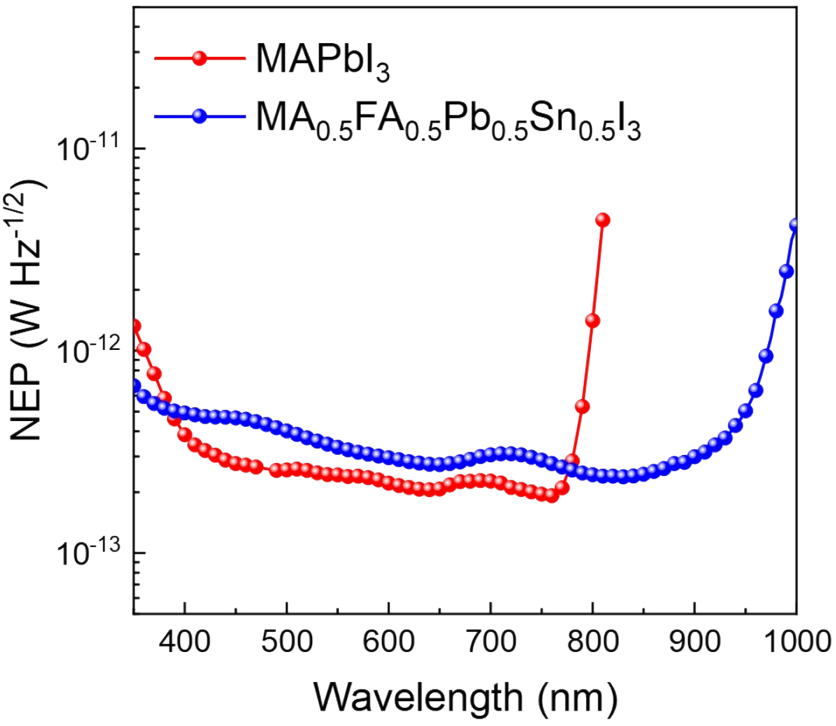

Figure S8. The NEP curves of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ PDs.

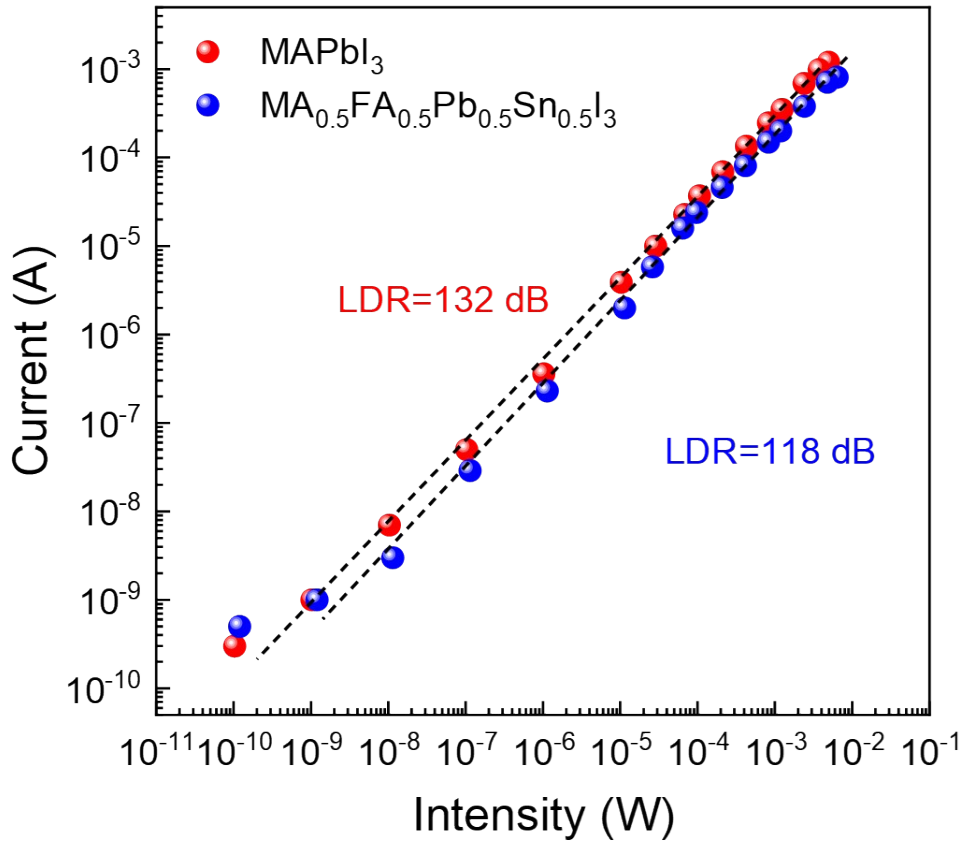

Figure S9. The linear dynamic range (LDR) of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ PDs.

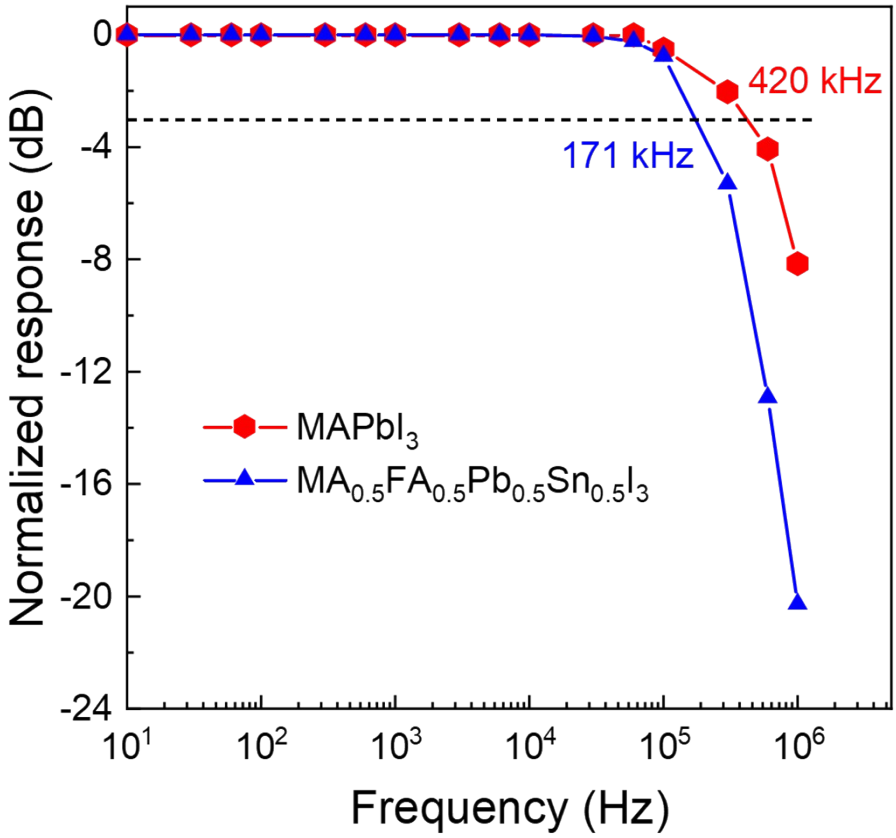

Figure S10. The typical -3 dB point frequency roll-off of $MAPbI_3$ and $MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ PDs.

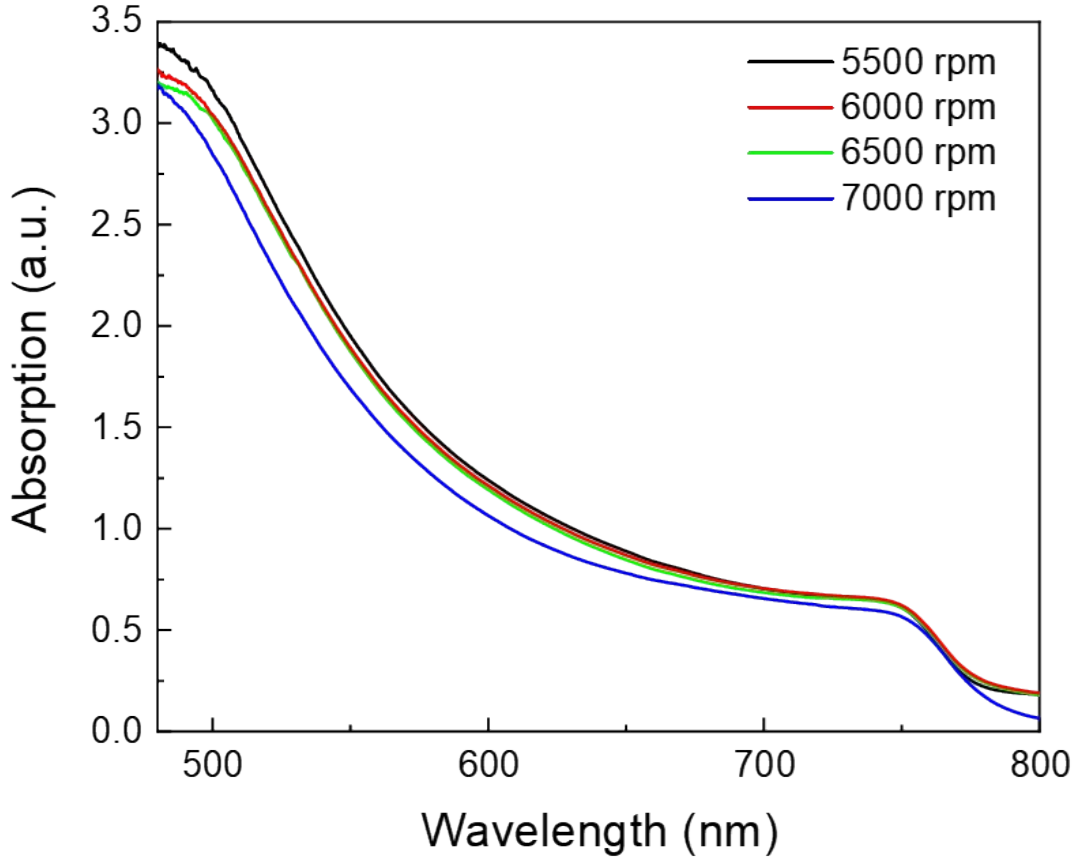

Figure S11. The absorption spectra of $MAPbI_3$ with spin coating speed of 5500, 6000, 6500, 7000 rpm.

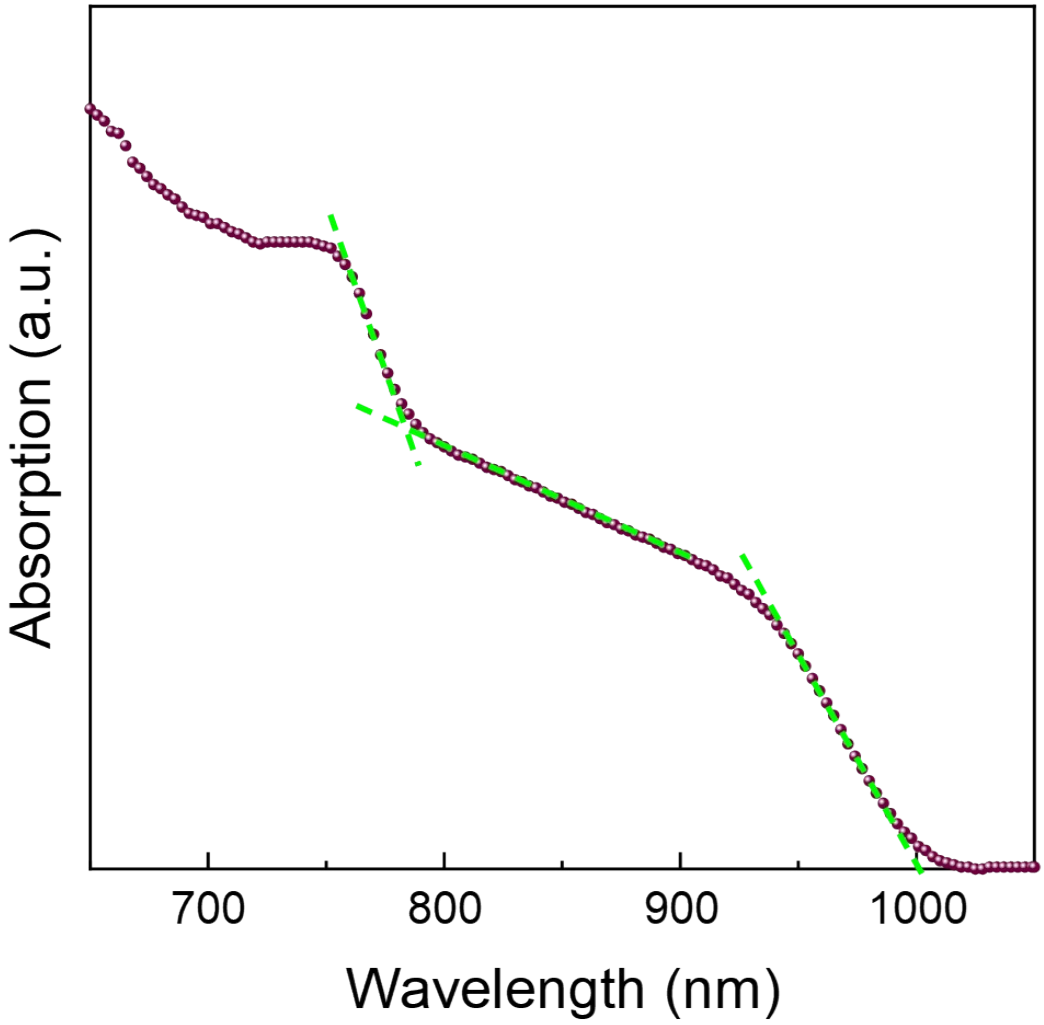

Figure S12. The normalized absorption spectra of $MAPbI_3$/$MA_{0.5}FA_{0.5}Pb_{0.5}Sn_{0.5}I_3$ film

Reference

1. R. Rehm, M. Walther, J. Schmitz, F. Rutz, A. Wörl, R. Scheibner and J. Ziegler, *Type-II superlattices: the Fraunhofer perspective*, SPIE, 2010.
2. R. Rehm, M. Walther, J. Schmitz, J. Fleissner, J. Ziegler, W. Cabanski and R. Breiter, *Electron. Lett* 2006, **42**, 577-578.