

Supporting Information

Achieving High-Performance, Self-Powered, Broadband Perovskite Photodetector Employing MAPbI_3 Microcrystal Films

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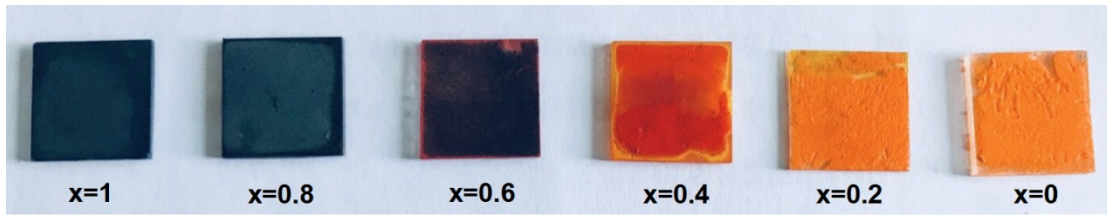


Figure S1 The photograph of MAPb(I_xBr_{1-x})₃ (x = 0, 0.2, 0.4, 0.6, 0.8, 1) MC Films

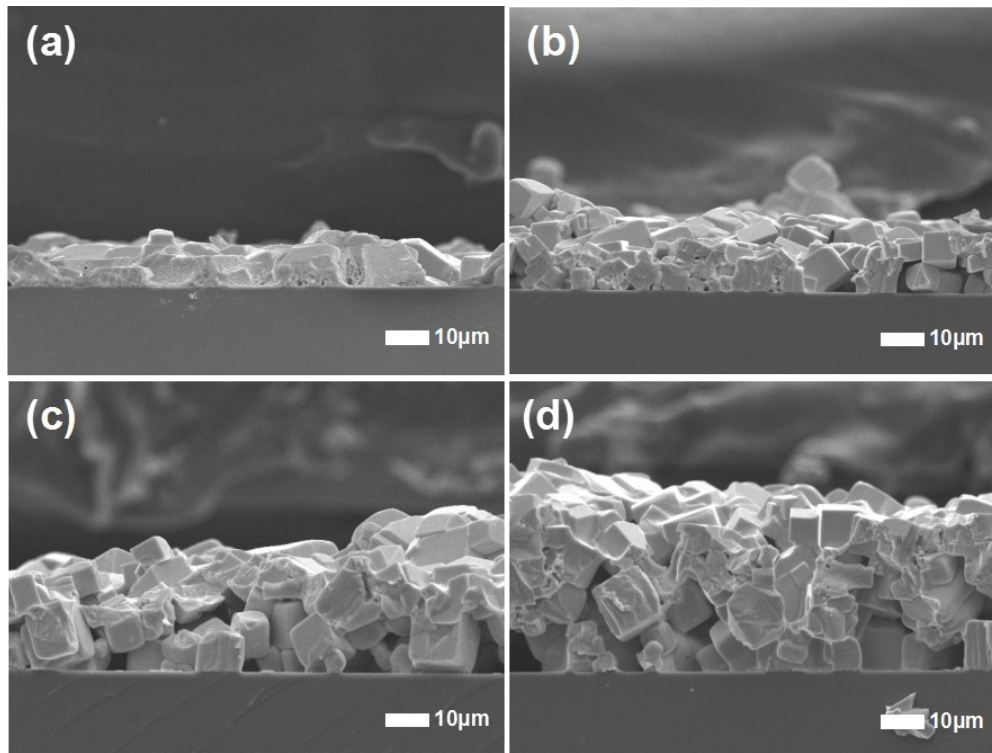


Figure S2 The MC films with the thickness of about (a) 10 μm, (b) 15 μm, (c) 25 μm and (d) 40 μm.

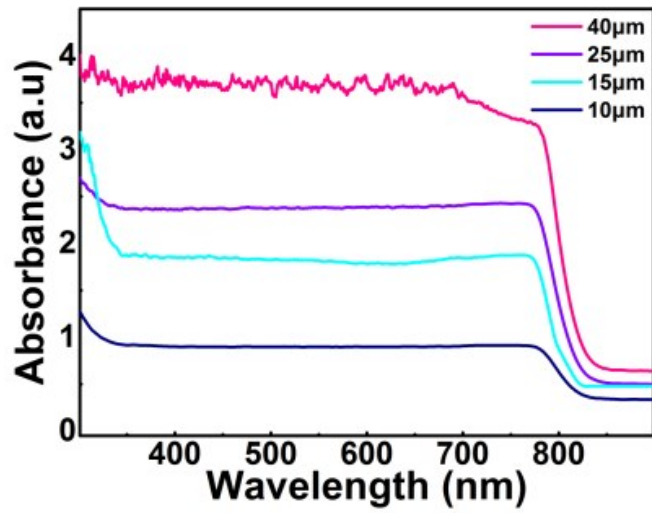


Figure S3 Light absorption curves of the MAPbI₃MC films with different thicknesses.



Figure S4 (a) SEM top view of the MAPbI₃ MCs. (b) UV-visible absorption spectrum of the MAPbI₃ MCs. (c) I-V curve of the MAPbI₃ MCs with FTO/MAPbI₃/FTO structure at dark.

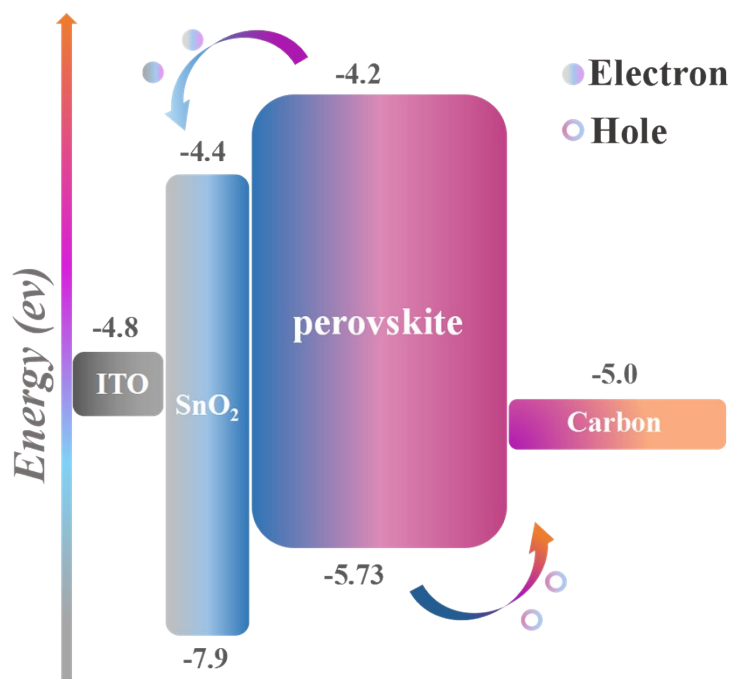


Figure S5 Energy band diagram of the perovskite MC PD.

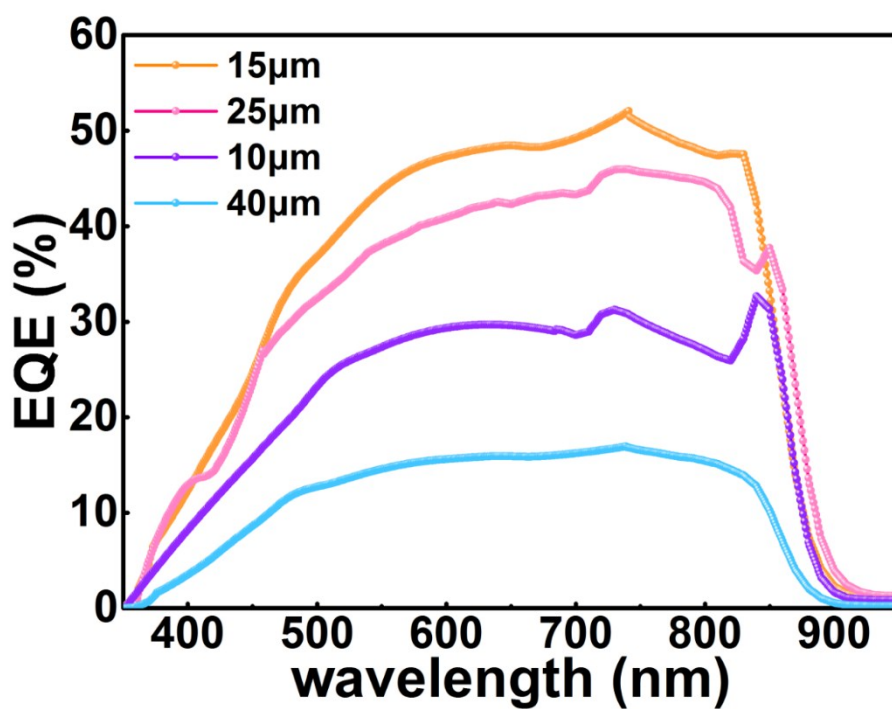


Figure S6 External quantum efficiency (EQE) of MAPbI₃ MCs thin film PD with different thickness at 0 V.

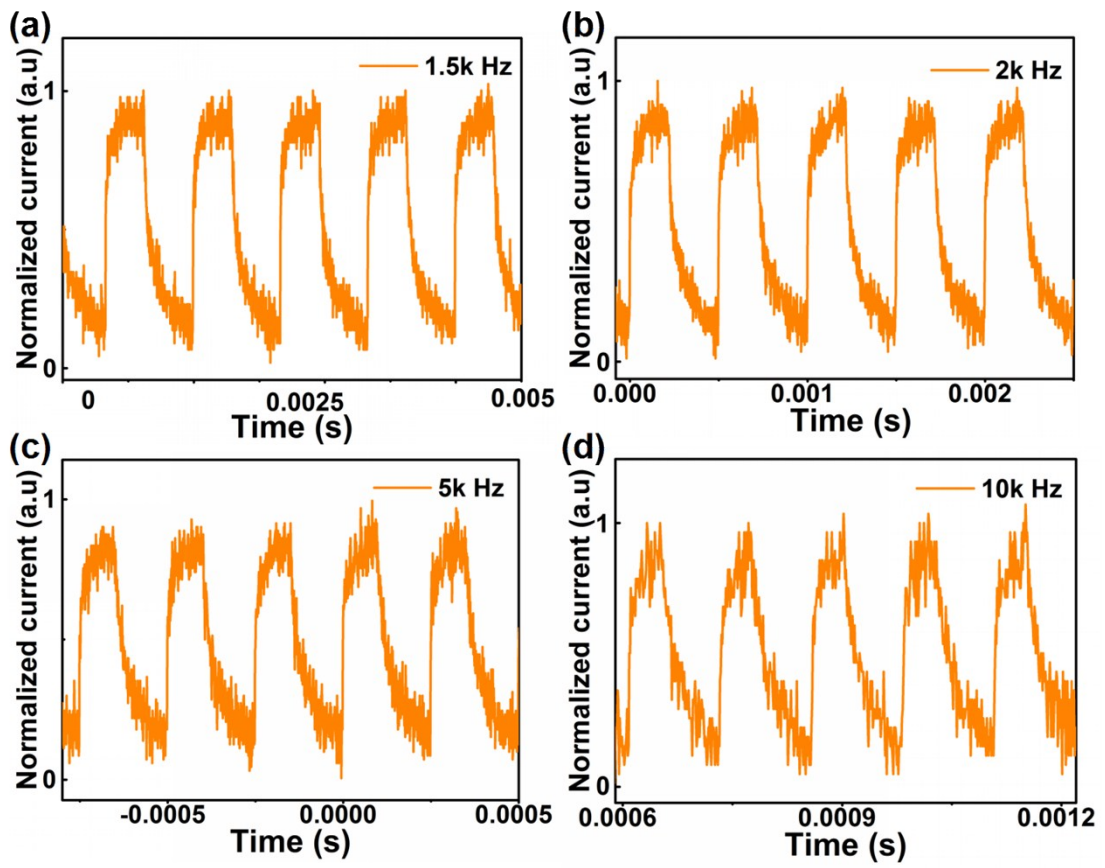


Figure S7 I-t curves of MAPbI₃ MCs thin film PD at different frequencies.

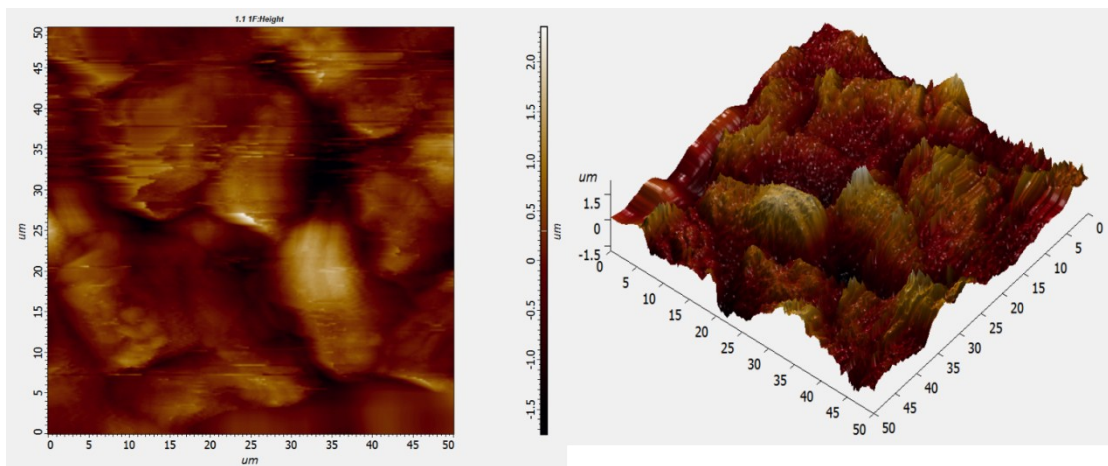


Figure S8 The AFM images of MAPbI₃ MC film.

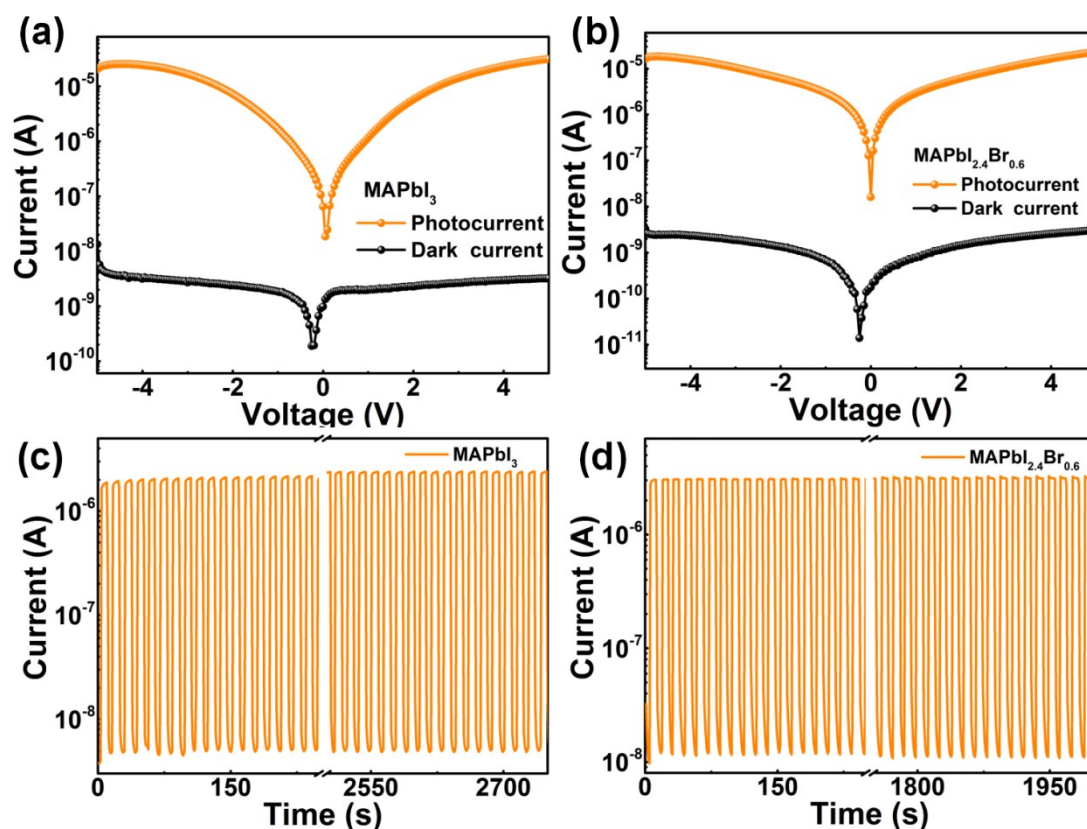


Figure S9 The device performance of metal-semiconductor-metal (MSM) structure PDs. (a) I-V curves of the MAPbI₃ MCPD; (b) I-V curves of the MAPbI_{2.4}Br_{0.6} MCPD; (c) long-time I-t curves of the MAPbI₃ MCPD; (d) long-time I-t curves of the MAPbI_{2.4}Br_{0.6} MCPD.

Figure S9 shows the device performance of metal-semiconductor-metal (MSM) structure perovskite MC PDs. Figure S9a and S9b display the dark- and photocurrent curves of the device under 473 nm laser irradiation with the light intensity of 440 mW cm⁻². It can be seen that both of the MAPbI₃ and MAPbI_{2.4}Br_{0.6} MCPD show superior photoelectric response performance with the on/off ratio of about 10⁴ at 4V, showing high switching characteristic. In addition, from the long-time I-t curves of the MAPbI₃ and MAPbI_{2.4}Br_{0.6} MCPD, we can see the photocurrent of both of the devices has almost no attenuation, indicating that our MCPDs show excellent light stability.