

Supporting Information

Pyroelectrically enhanced high-sensitivity self-powered position-sensitive detector based on ZnO/P(VDF-TrFE)-MAPbI₃ heterojunction with multifunctional imaging capability

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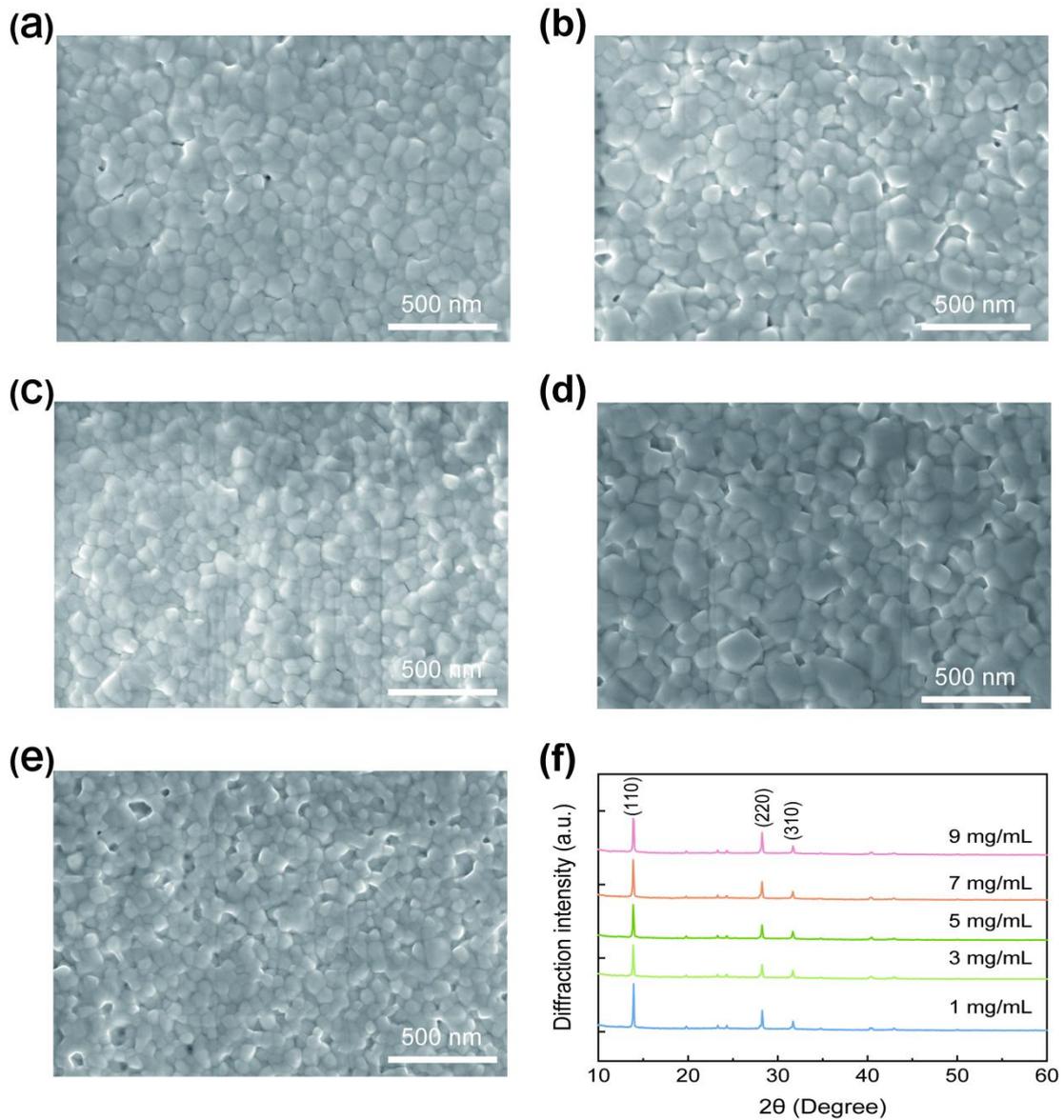


Fig. S1. (a) Top-view SEM images of P(VDF-TrFE)-MAPbI₃ thin films with different P(VDF-TrFE) doping concentrations: (a) 1 mg/mL, (b) 3 mg/mL, (c) 5 mg/mL, (d) 7 mg/mL, (e) 9 mg/mL. (f) XRD diffraction results of P(VDF-TrFE)-MAPbI₃ thin films with different P(VDF-TrFE) doping concentrations.

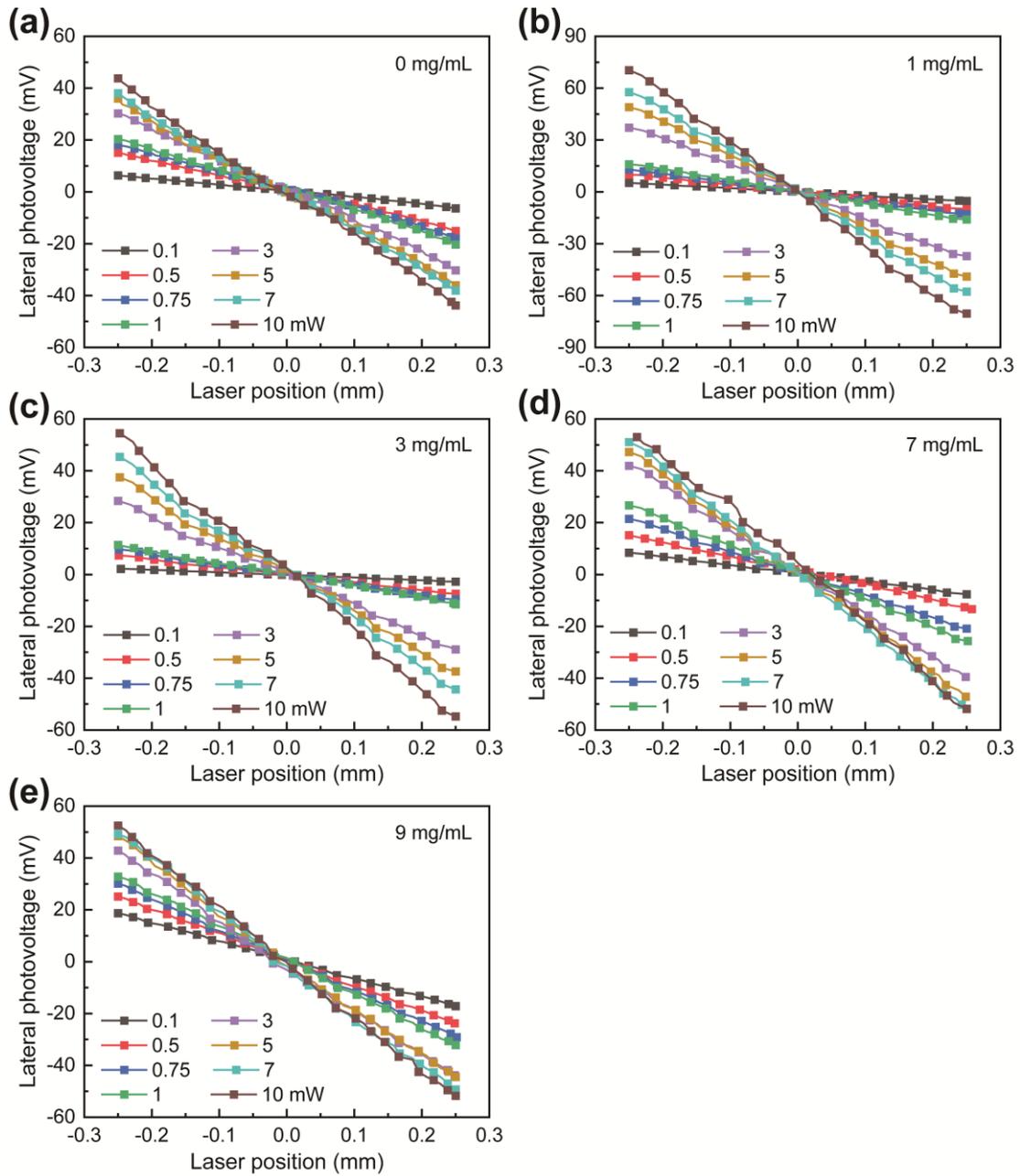


Fig. S2. LPV curves of ZnO/P(VDF-TrFE)-MAPbI₃ heterojunction with different doping concentrations of P(VDF-TrFE) at (a) 0 mg/mL, (b) 1 mg/mL, (c) 3 mg/mL, (d) 7mg/mL, (e) 9mg/mL under 671 nm wavelength laser illumination with different powers.

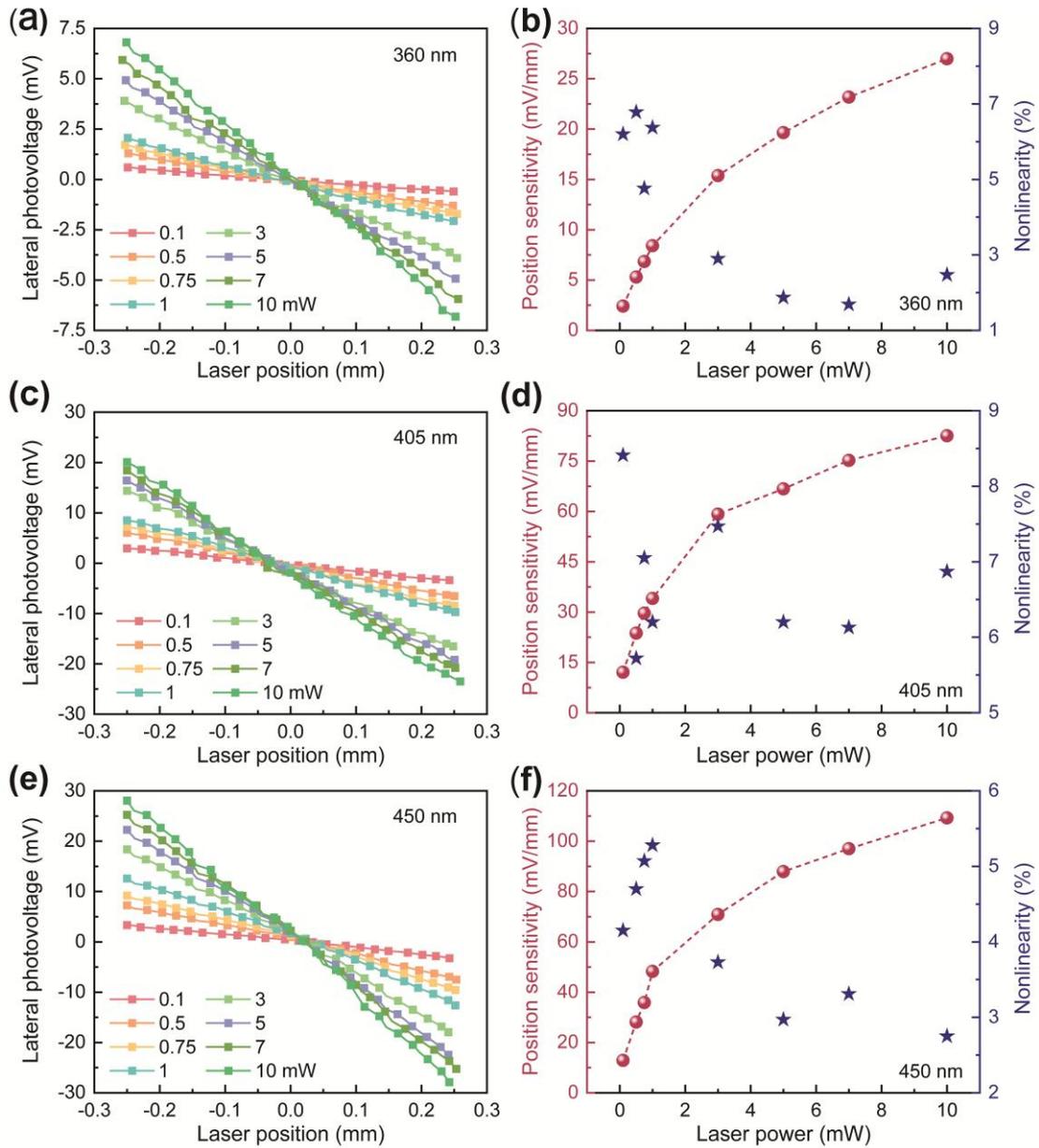


Fig. S3. (a) Laser position-dependent LPV curves of the PSD under 360 nm laser illumination with different powers. (b) Extracted PSs and nonlinearities of various laser powers. (c) Laser position-dependent LPV curves of the PSD under 405 nm laser illumination with different powers. (d) Extracted PSs and nonlinearities of various laser powers. (e) Laser position-dependent LPV curves of the PSD under 450 nm laser illumination with different powers. (f) Extracted PSs and nonlinearities of various laser powers.

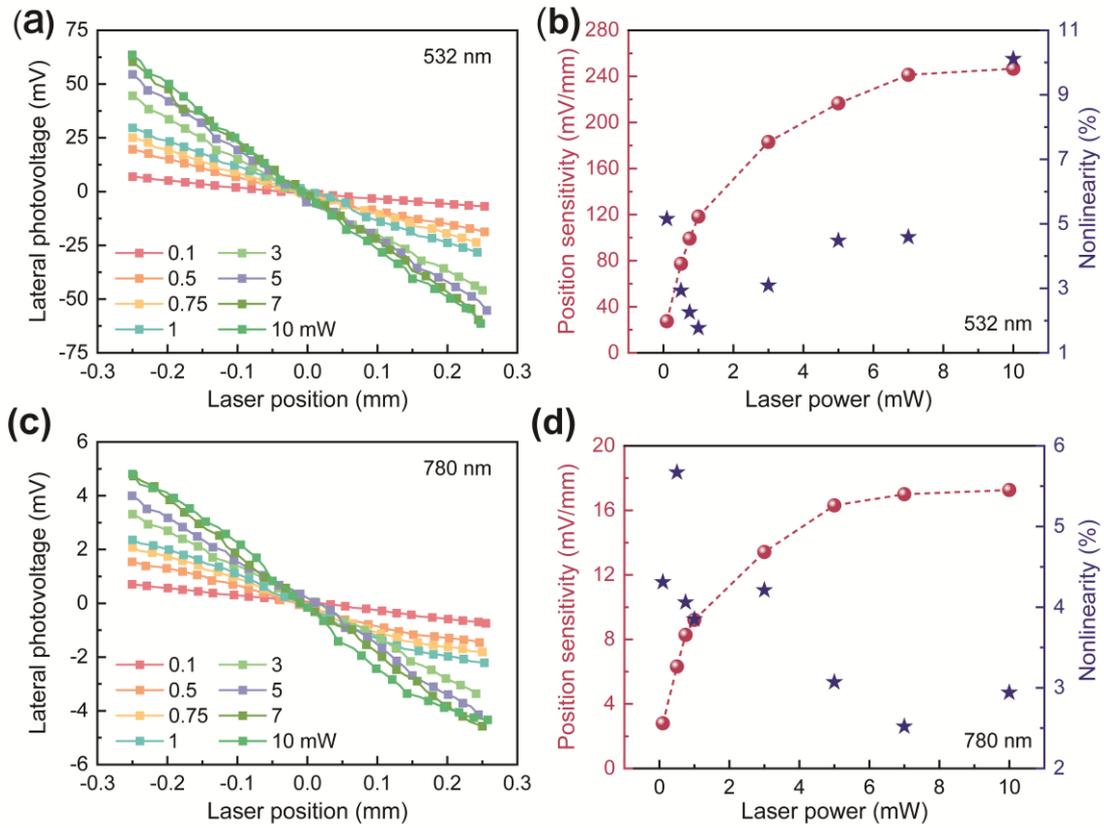


Fig. S4. (a) Laser position-dependent LPV curves of the PSD under 532 nm laser illumination with different powers. (b) Extracted PSs and nonlinearities of various laser powers. (c) Laser position-dependent LPV curves of the PSD under 780 nm laser illumination with different powers. (d) Extracted PSs and nonlinearities of various laser powers.

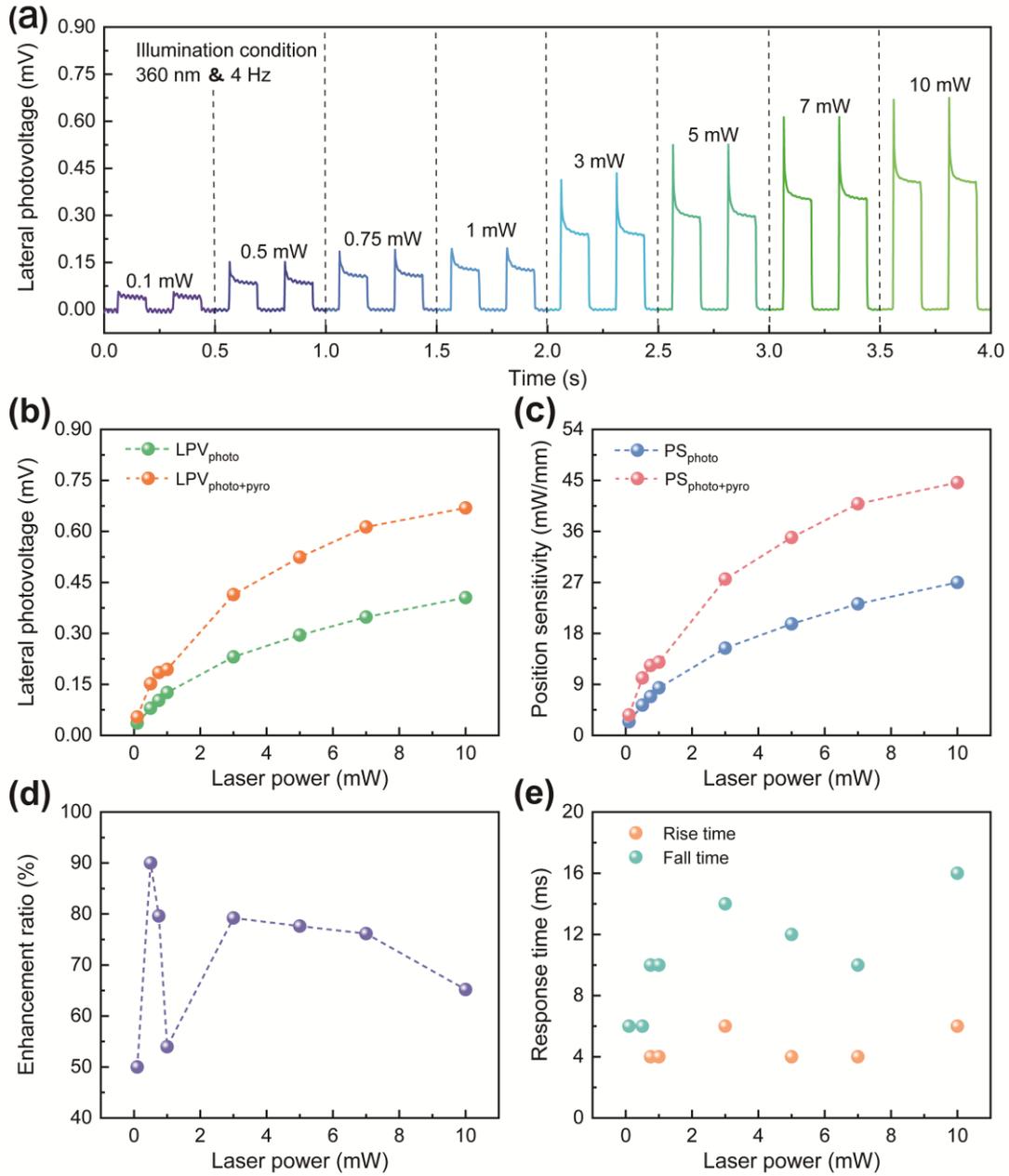


Fig. S5. (a) Transient LPV- t curves of different powers under irradiation of a 360 nm laser. The extracted (b) LPVs, (c) PSs, (d) enhancement ratios, and (e) response times of different powers.

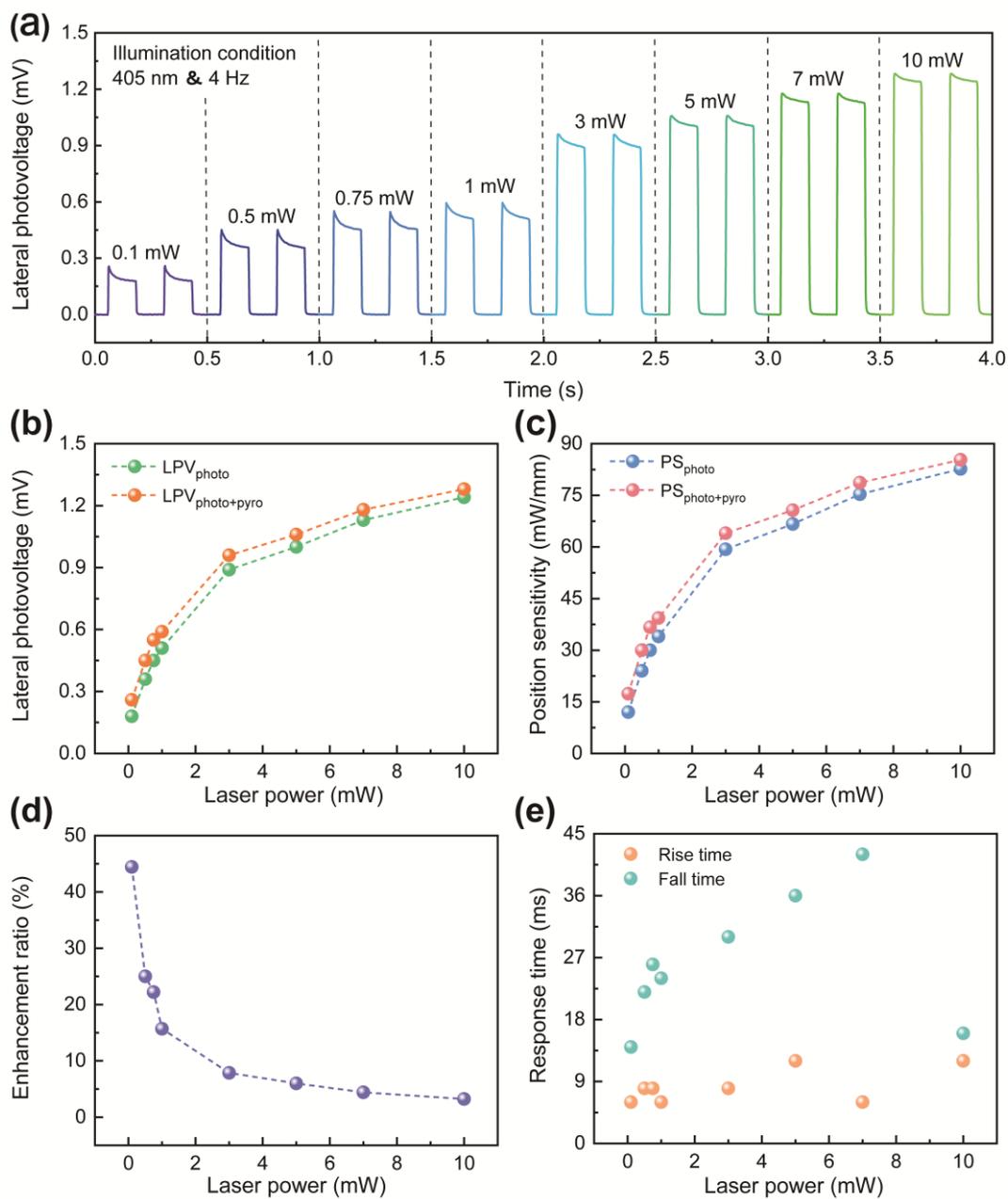


Fig. S6. (a) Transient LPV- t curves of different powers under irradiation of a 405 nm laser. The extracted (b) LPVs, (c) PSs, (d) enhancement ratios, and (e) response times of different powers.

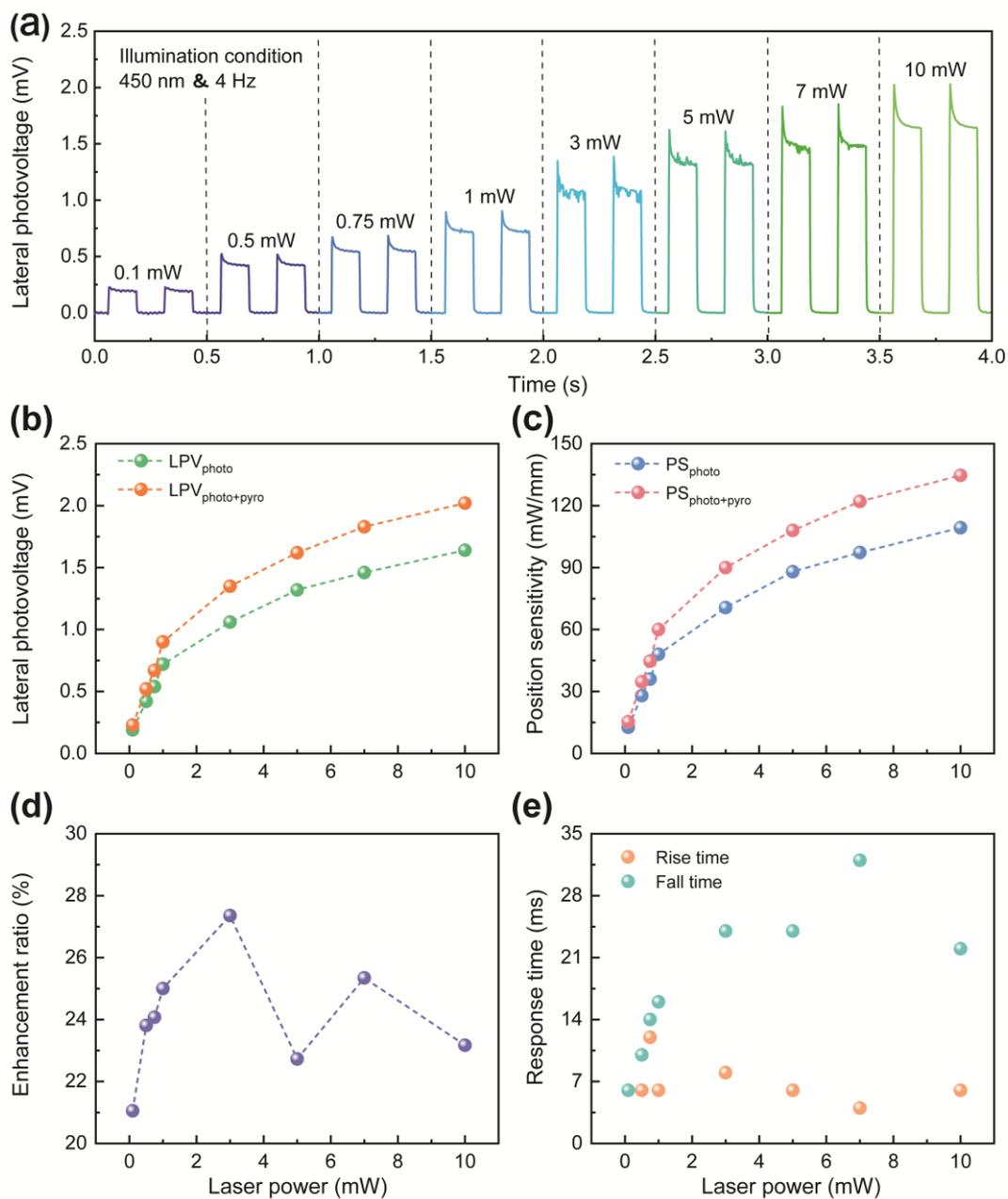


Fig. S7. (a) Transient LPV- t curves of different powers under irradiation of a 450 nm laser. The extracted (b) LPVs, (c) PSs, (d) enhancement ratios, and (e) response times of different powers.

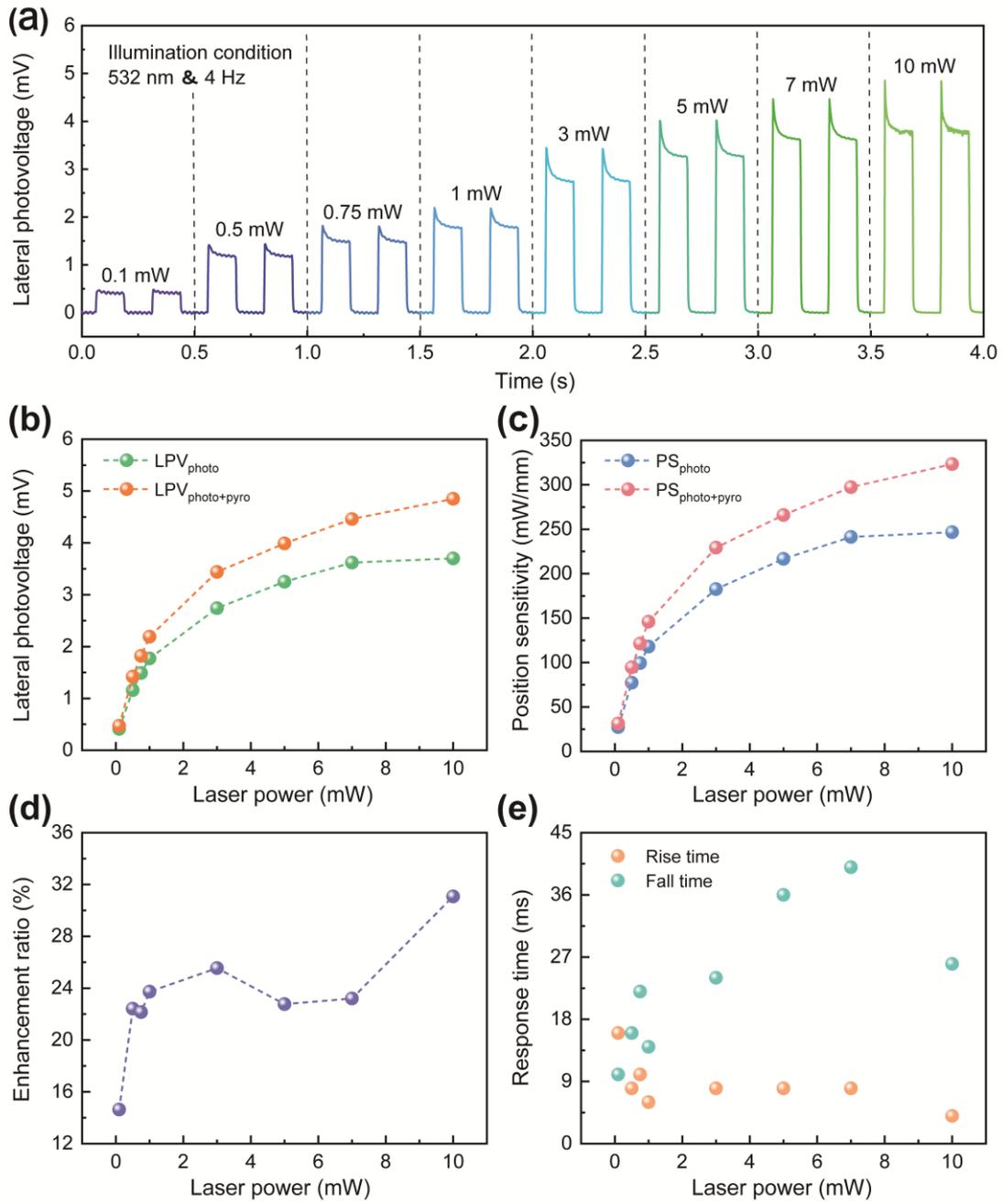


Fig. S8. (a) Transient LPV- t curves of different powers under irradiation of a 532 nm laser. The extracted (b) LPVs, (c) PSs, (d) enhancement ratios, and (e) response times of different powers.

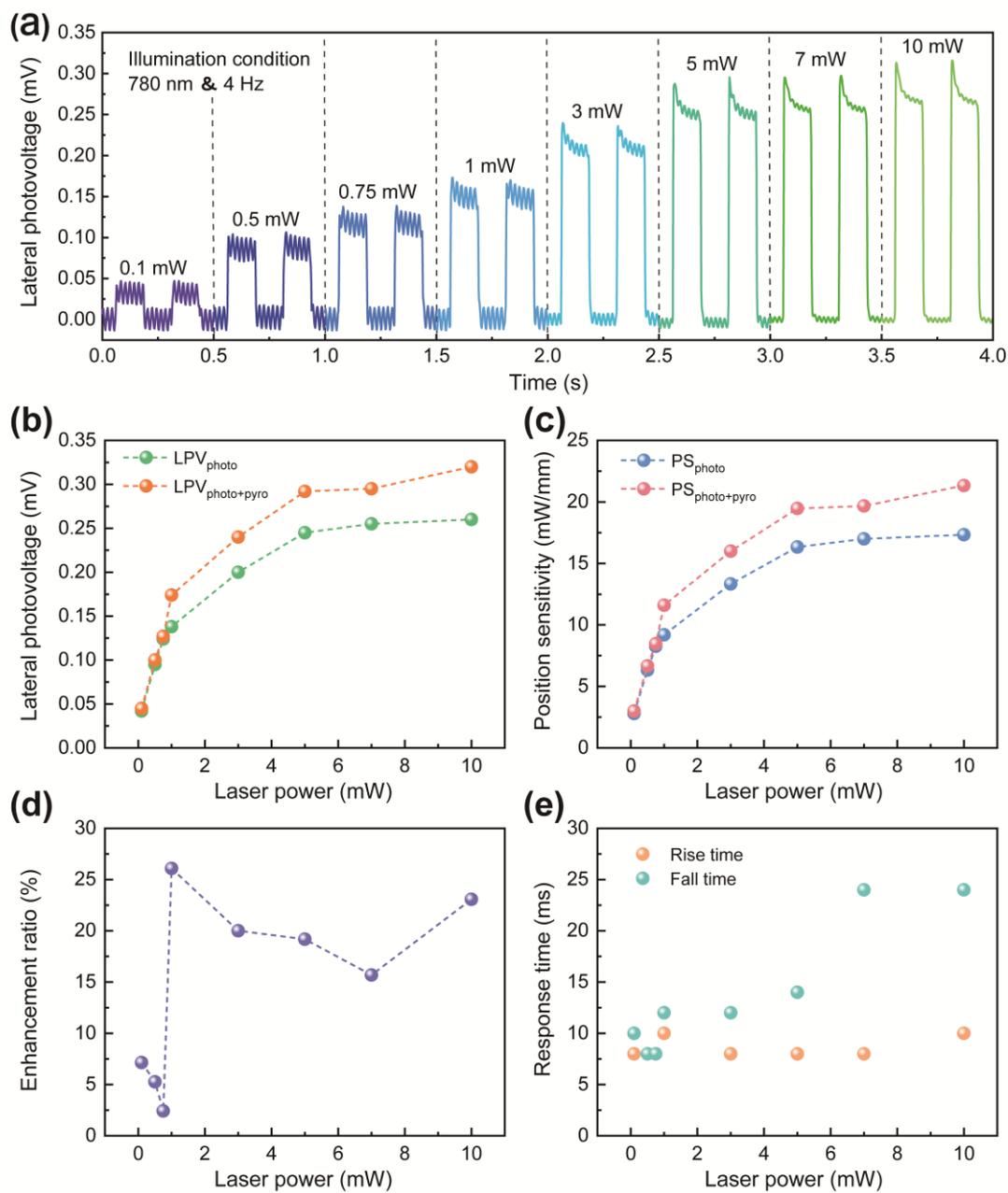


Fig. S9. (a) Transient LPV- t curves of different powers under irradiation of a 780 nm laser. The extracted (b) LPVs, (c) PSs, (d) enhancement ratios, and (e) response times of different powers.

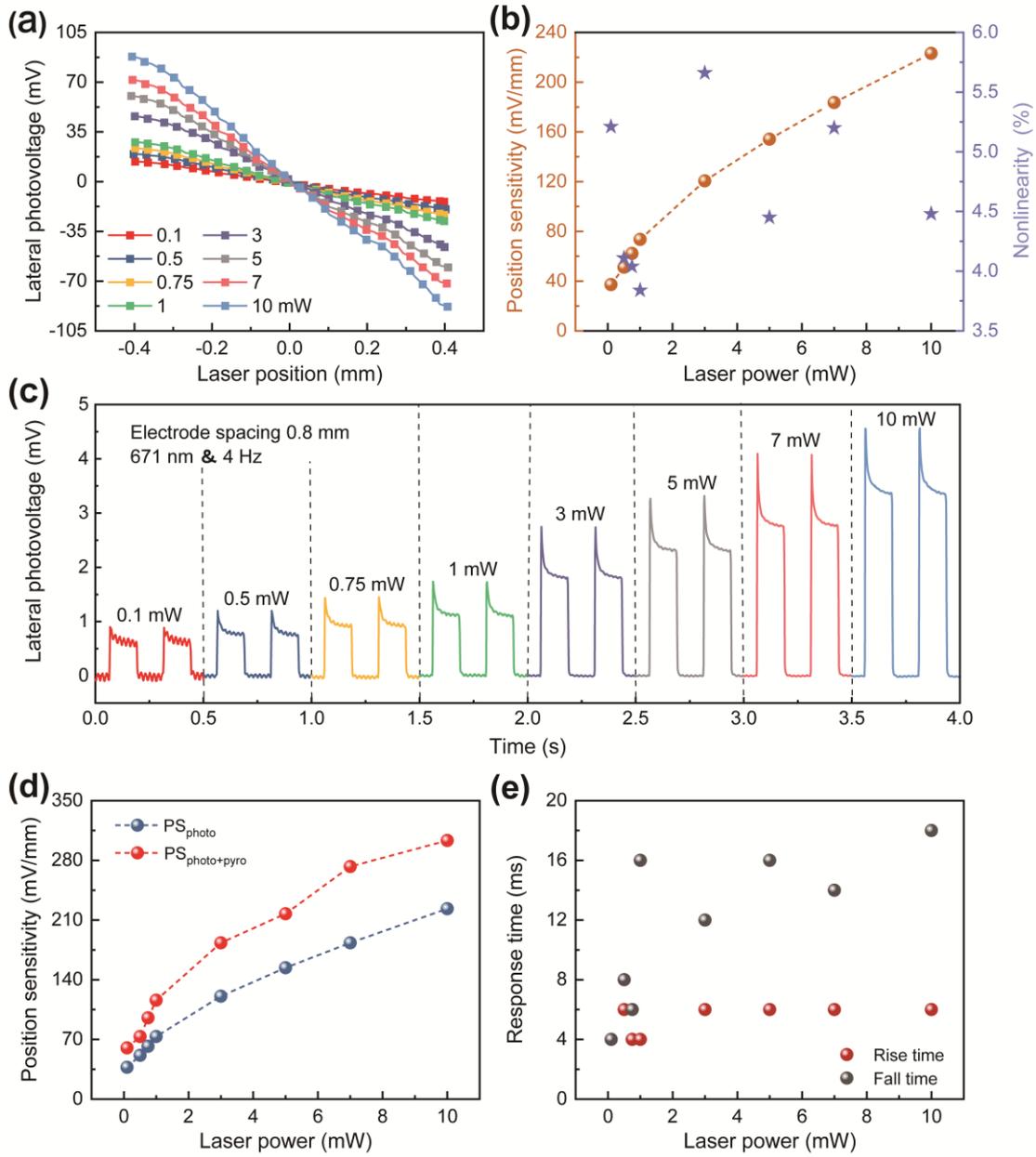


Fig. S10. Transient LPV response of the ZnO/P(VDF-TrFE)-MAPbI₃ heterojunction PSD under illumination of 671 nm laser at 4 Hz. The extracted (a) LPVs, (b) PSs and nonlinearity of different powers. (c) Transient LPV-*t* curves at $x = -0.8$ mm with various powers. Extracted (d) PSs, and (e) response times of different powers.

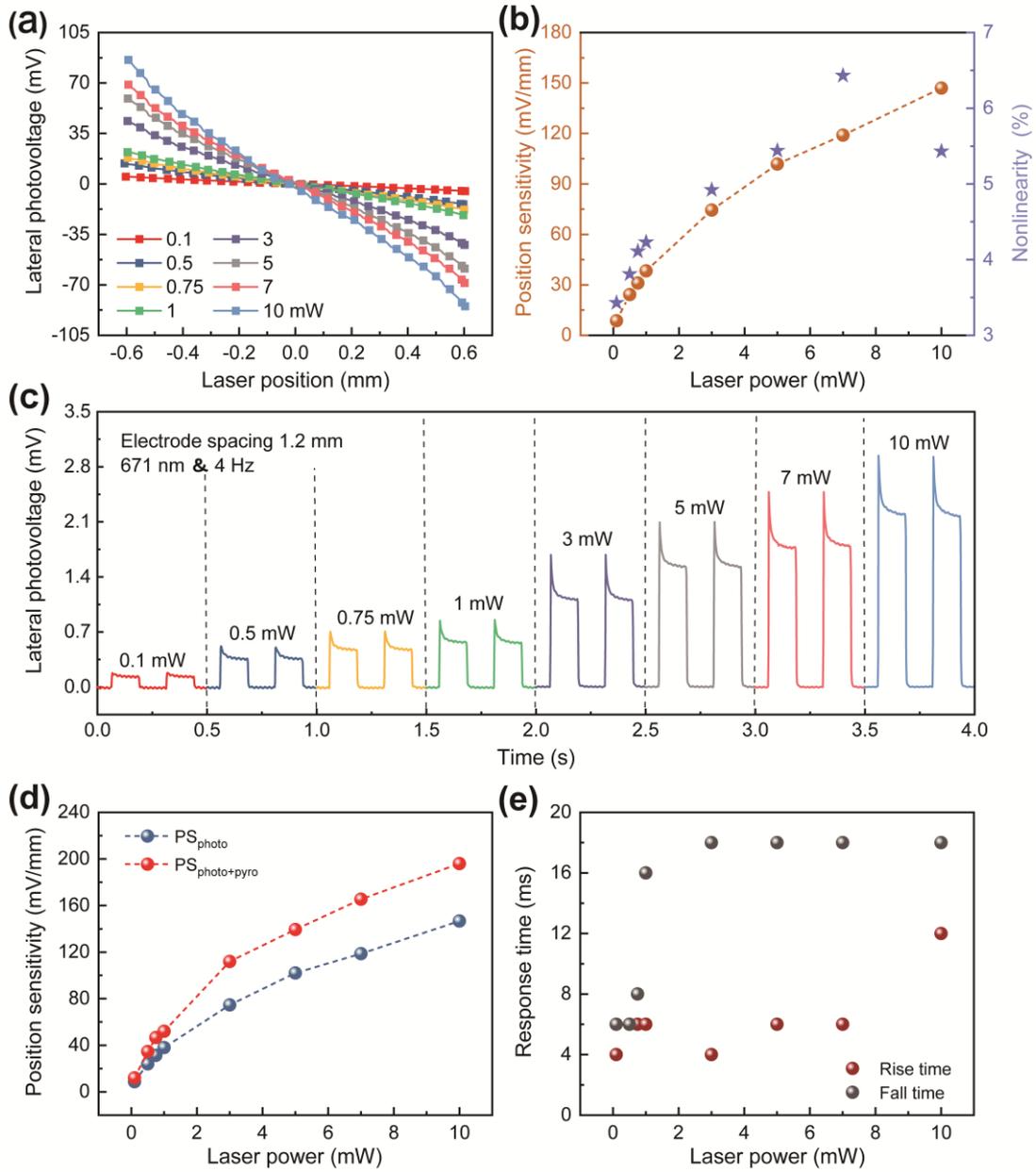


Fig. S11. Transient LPV response of the ZnO/P(VDF-TrFE)-MAPbI₃ heterojunction PSD under illumination of 671 nm laser at 4 Hz. The extracted (a) LPVs, (b) PSs and nonlinearity of different powers. (c) Transient LPV- t curves at $x = -1.2$ mm with various powers. Extracted (d) PSs, and (e) response times of different powers.

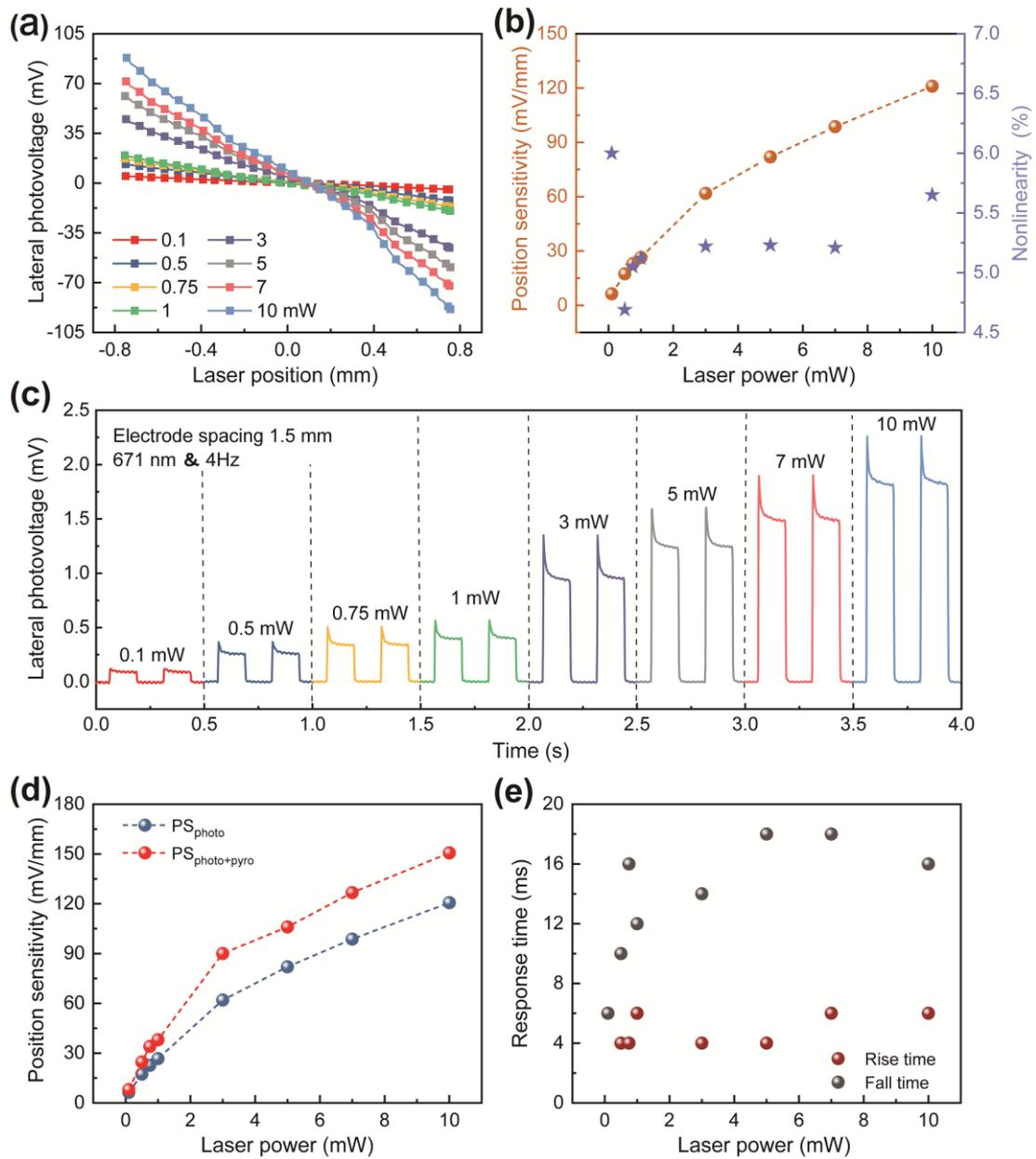


Fig. S12. Transient LPV response of the ZnO/P(VDF-TrFE)-MAPbI₃ heterojunction PSD under illumination of 671 nm laser at 4 Hz. The extracted (a) LPVs, (b) PSs and nonlinearity of different powers. (c) Transient LPV- t curves at $x = -1.5$ mm with various powers. Extracted (d) PSs, and (e) response times of different powers.

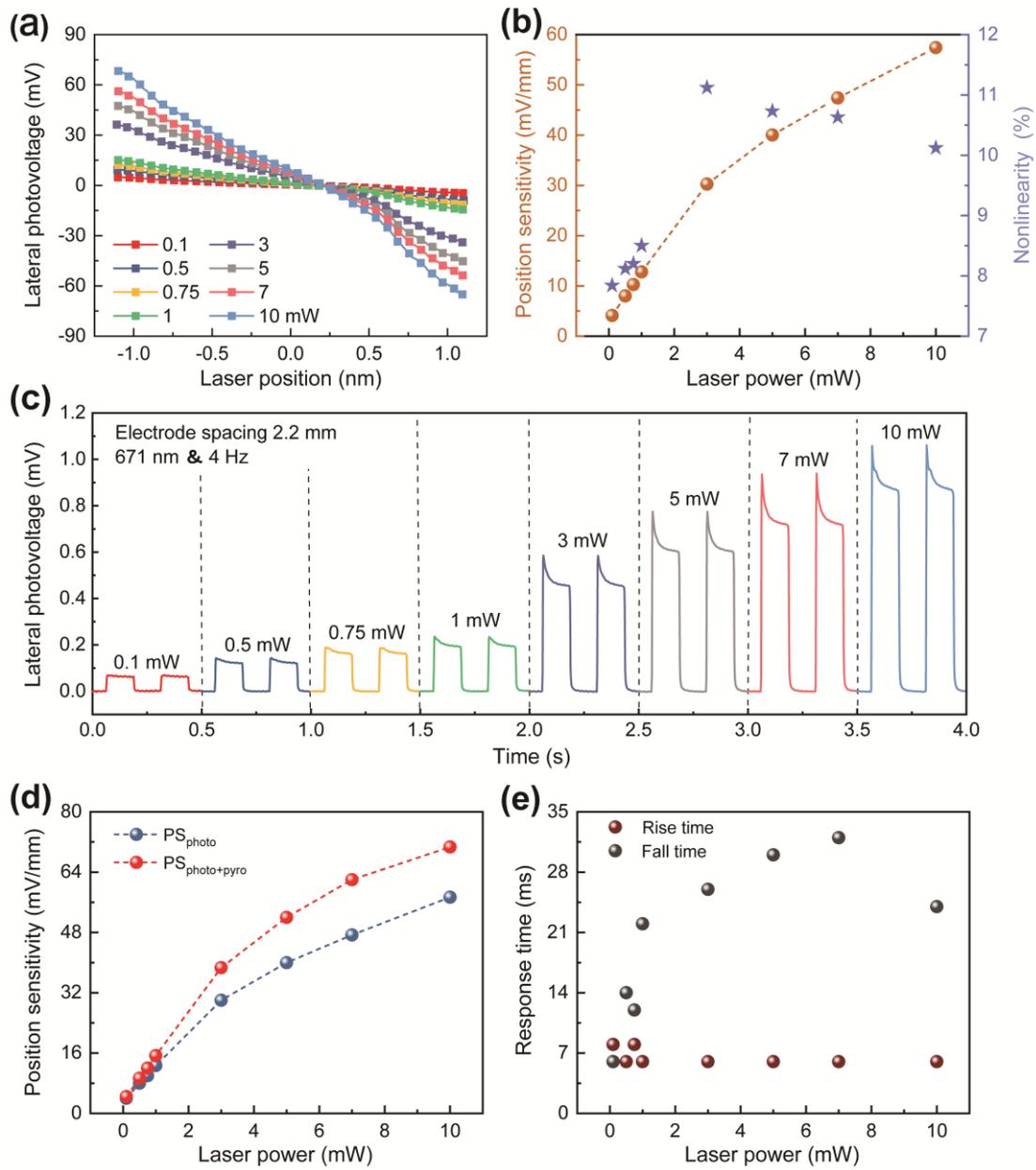


Fig. S13. Transient LPV response of the ZnO/P(VDF-TrFE)-MAPbI₃ heterojunction PSD under illumination of 671 nm laser at 4 Hz. The extracted (a) LPVs, (b) PSs and nonlinearity of different powers. (c) Transient LPV- t curves at $x = -2.2$ mm with various powers. Extracted (d) PSs, and (e) response times of different powers.

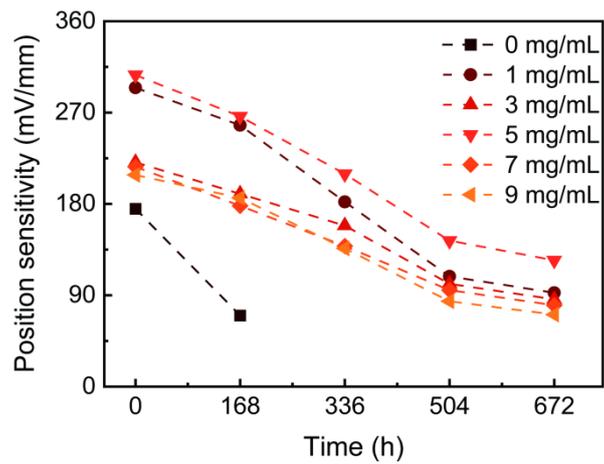


Fig. S14. Stability test of unencapsulated devices in ambient air for 672 h.