

Supporting Information

Ferroelectrically modulated ultrasensitive two-dimensional perovskite phototransistor with zero-gate-bias

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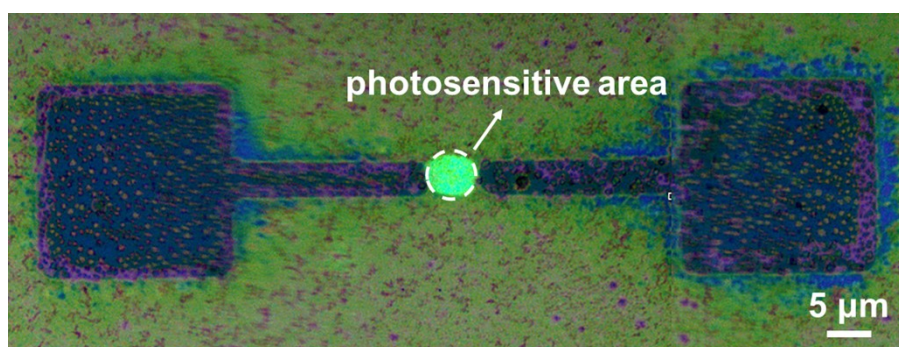


Fig. S1 Optical microscopy image of the fabricated phototransistor under illumination with a photosensitive area of $28.5 \mu\text{m}^2$.

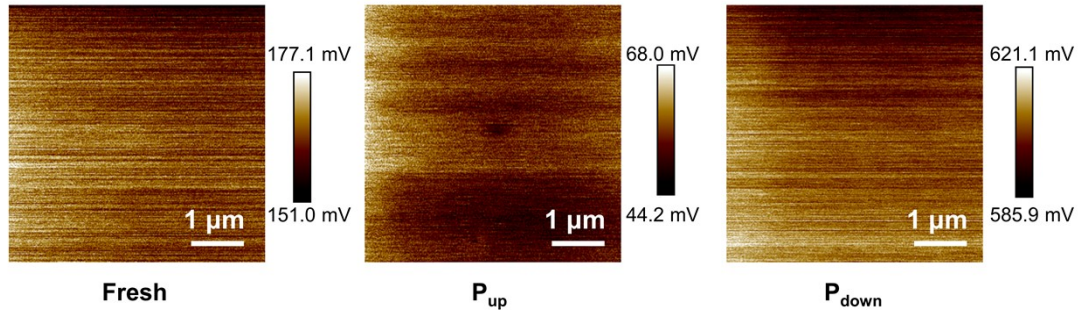


Fig. S2 Contact potential difference maps of $(\text{PEA})_2\text{SnI}_4$ on Al:HfO_2 ferroelectric film in Fresh (without polarization), P_{up} (upward polarization) and P_{down} (downward polarization) states through KPFM measurements.

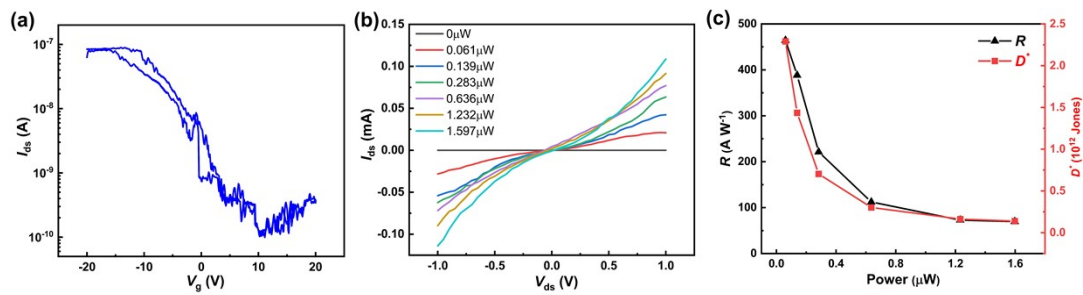


Fig. S3. Optoelectronic performances of $\text{SiO}_2/(\text{PEA})_2\text{SnI}_4$ phototransistor. (a) Transfer curve of the proposed device. (b) Output curves under different illumination powers of the fabricated device. (c) Incident light power dependence of responsivity (R) and detectivity (D^*) at $V_g=20$ V.

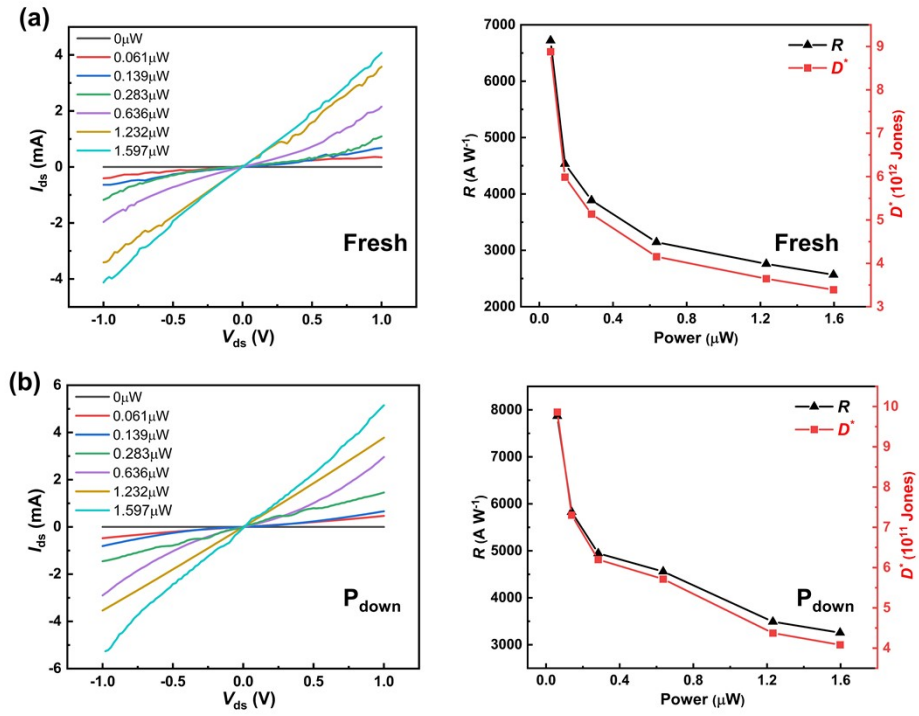


Fig. S4 Output curves of the ferroelectric-gated device under varied illumination powers, and the incident light power dependence of responsivity (R) and detectivity (D^*) in (a) Fresh (without polarization) and (b) P_{down} (downward polarization) state, respectively.