

In-Situ Growth of 2D Assisted Passivation layer Enable High-performance and Stable 2D/3D Stacked Perovskite Photodetectors for Visible Light Communication Applications

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Table S1 The parameters of PL lifetime by fitting the TRPL spectra of BAAc-PSK, BAI-PSK and 3D-PSK films.

Samples	τ_1 (ns)	A_1 (%)	τ_2 (ns)	A_2 (%)
BAAc-PSK	77.59	2.3	815.09	97.7
BAI-PSK	38.87	10.80	490.17	89.20
3D-PSK	23.38	20.54	322.34	79.46

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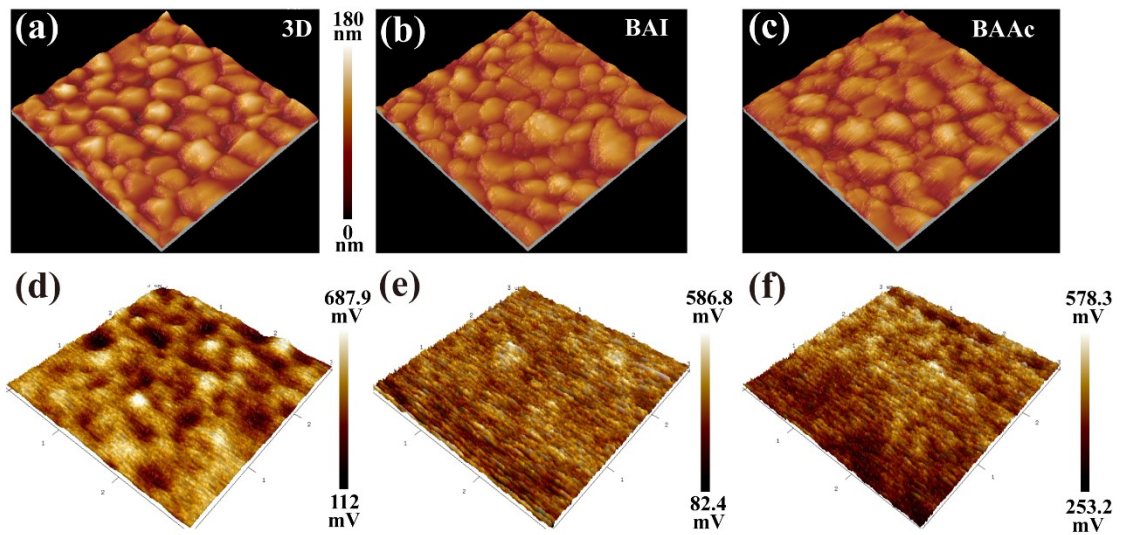


Fig. S1 (a–c) 3D AFM images of 3D-PSK, BAI-PSK and BAAc-PSK films. (d–f) 3D CPD mappings of 3D-PSK, BAI-PSK and BAAc-PSK films.

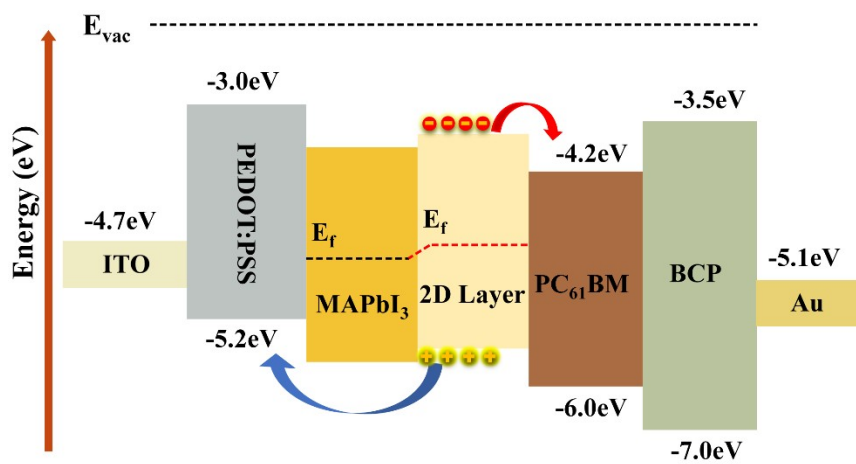


Fig. S2 Energy level diagram of 2D/3D stacked PPDs.

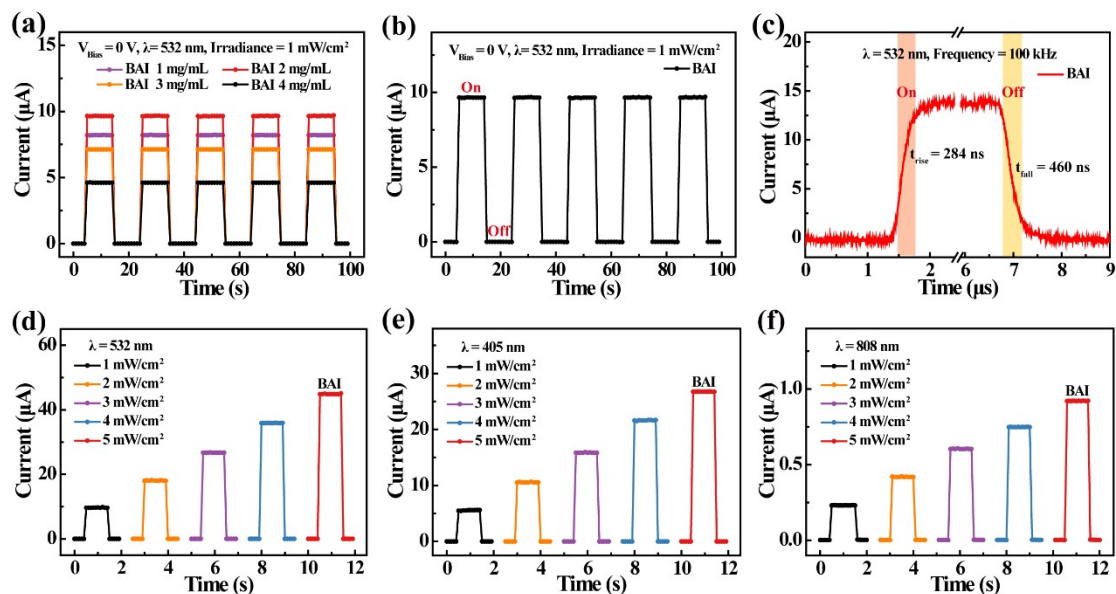


Fig. S3 (a) Photocurrent response of 2D/3D PPDs treated with different concentrations of BAI under 532 nm light illumination with a power density of 1 mW cm^{-2} . (b) Photoswitching characteristic of the BAI-PPD under the periodic illumination of 532 nm laser. (c) Temporal photocurrent response during one ON/OFF illumination switching at a pulse frequency of 100 kHz. (d–f) Photocurrent responses of the BAI-PPD illuminated by 532, 405 and 808 nm lasers at different power densities.

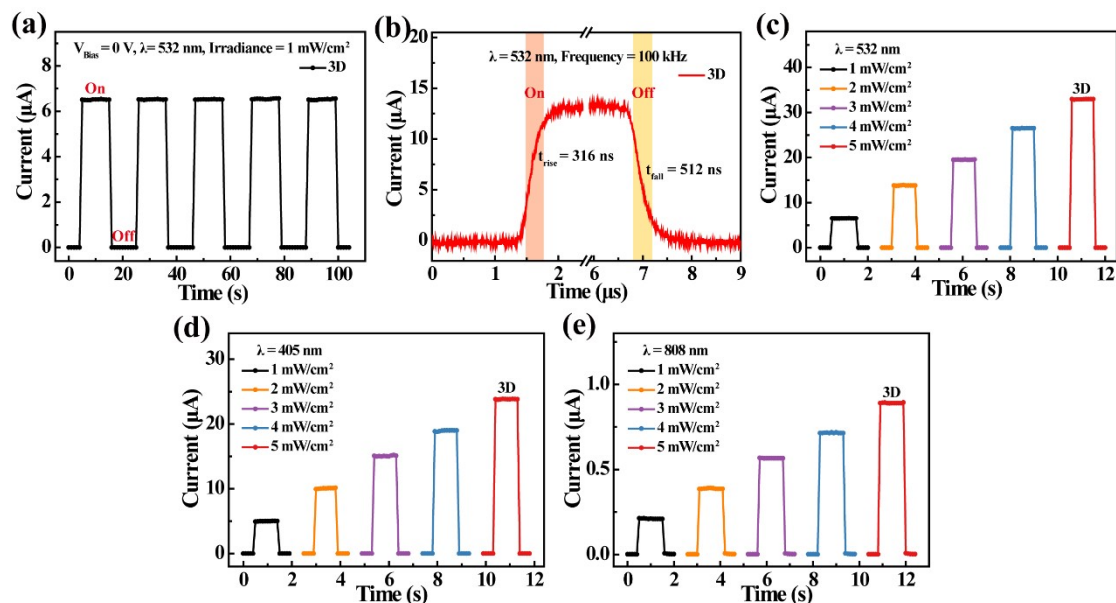


Fig. S4 (a) Photoswitching characteristic of the 3D-PPD under the periodic illumination of 532

nm laser. (b) Temporal photocurrent response during one ON/OFF illumination switching at a pulse frequency of 100 kHz. (c–e) Photocurrent responses of the 3D-PPD illuminated by 532, 405 and 808 nm lasers at different power densities.

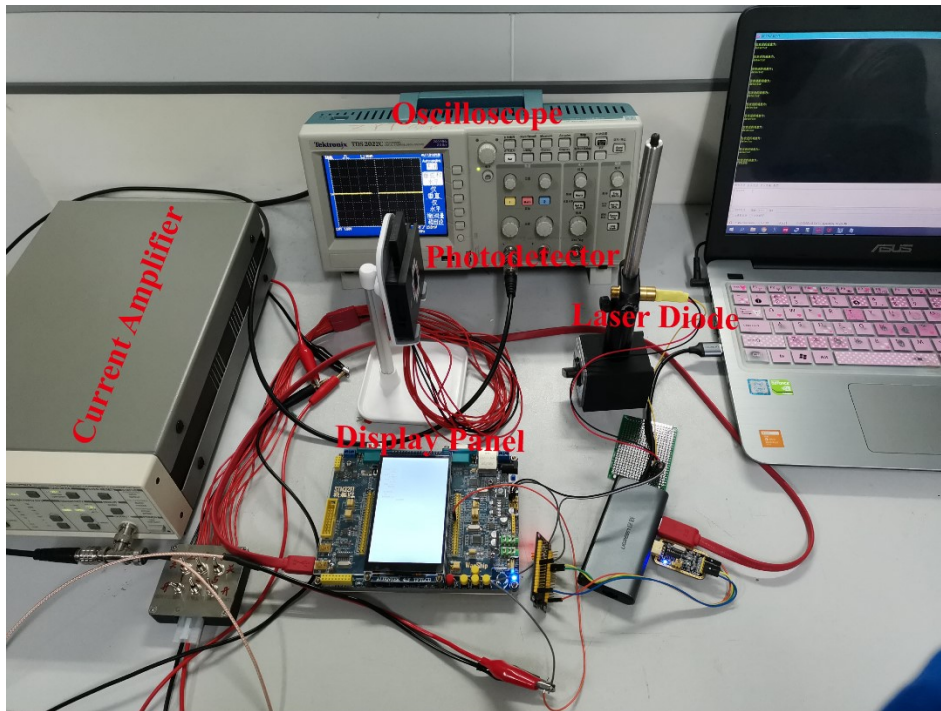


Fig. S5 The photograph of the visible light communication system (see Video 1).

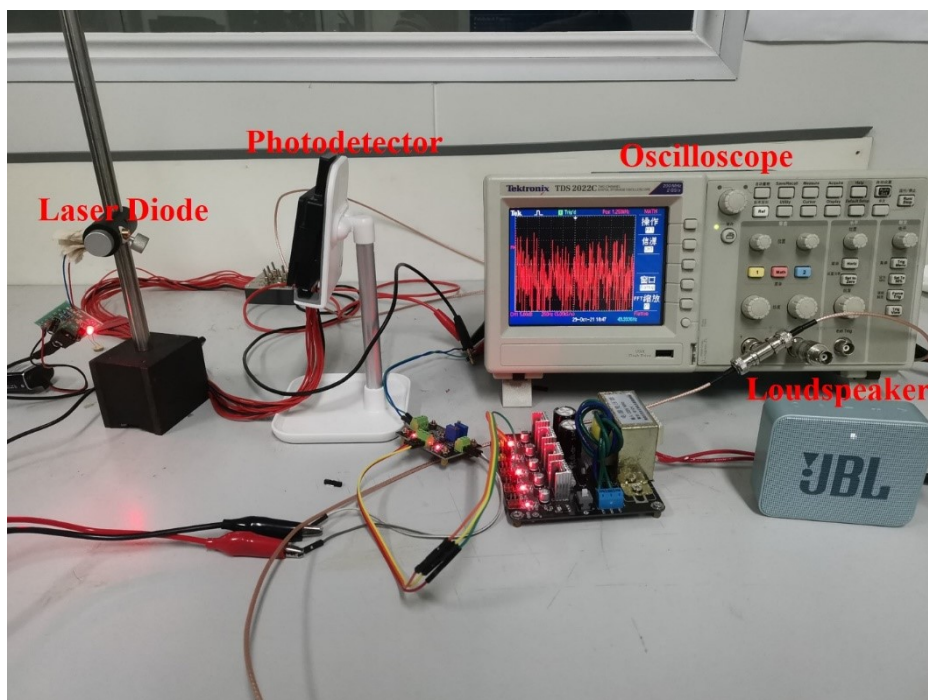


Fig. S6 The photograph of the audio transmission system (see Video 2).