Supporting Information

On the mechanism to suppress dark current via blending all-inorganic pervoskite precursor for colloidal quantum dots photodetectors

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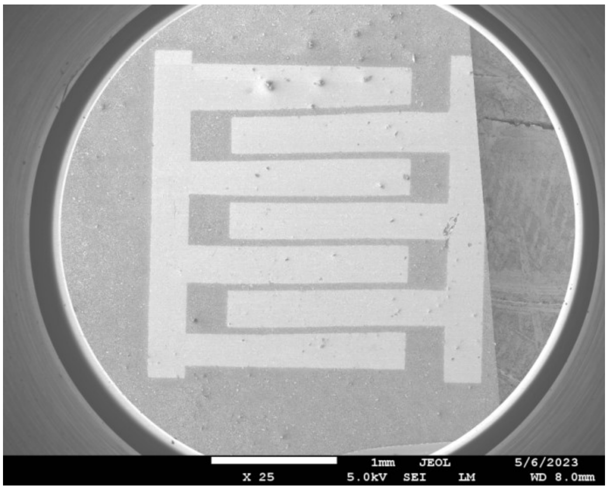

Fig. S1 SEM image of Ag interdigital electrode for the device active area

100 nm of Ag interdigital electrode was deposited on the top of the PbS:$CsPbBr_3$ hybrid film, with a channel width of 50 μm and an active area of 0.0075 cm^2, as shown in Fig. S1. Si substrate act as one electrode and the Ag interdigital electrode act as another electrode.

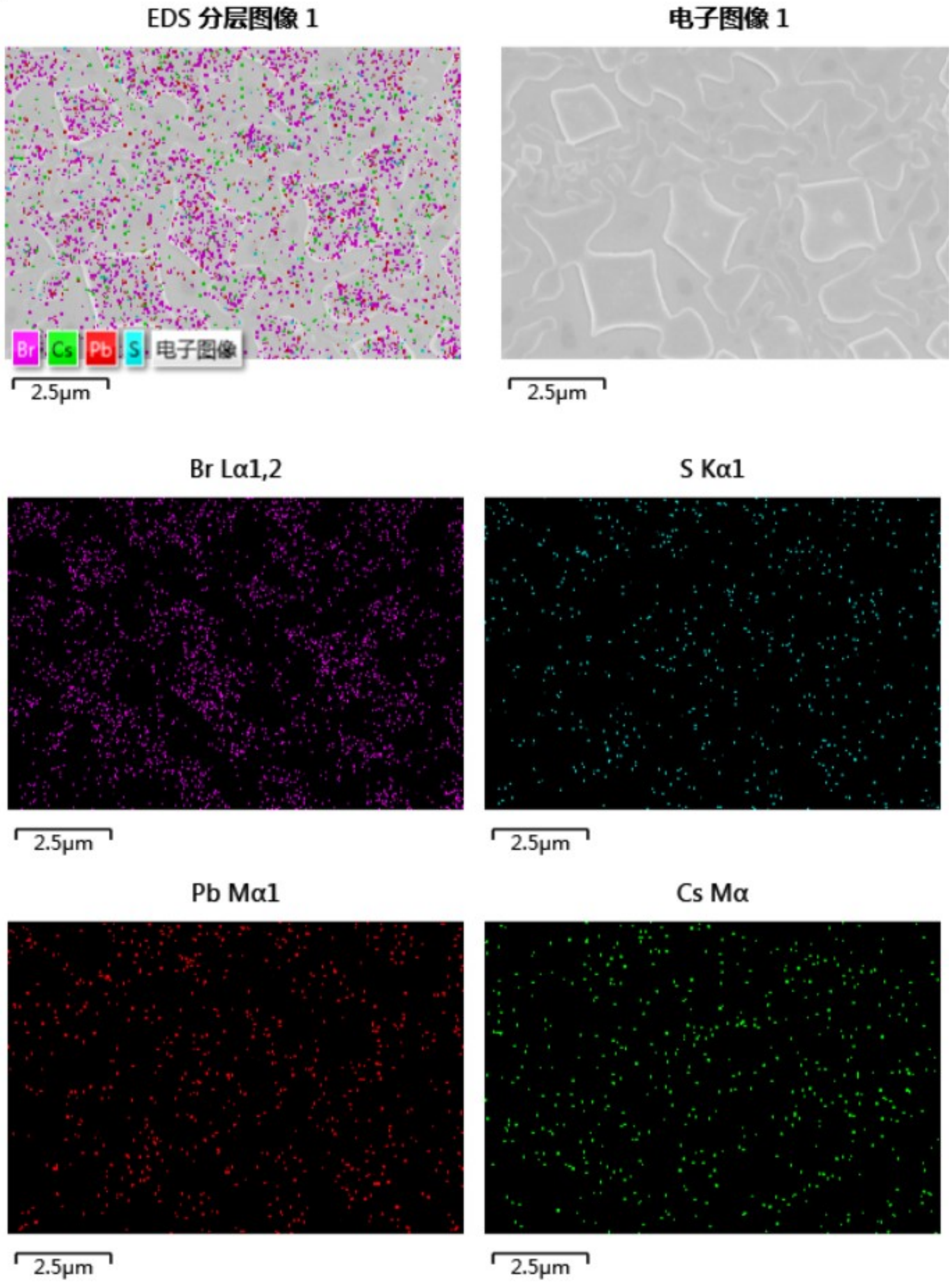

Fig. S2 EDS image of $PbS:CsPbBr_3$ hybrid film with K_v=1:2

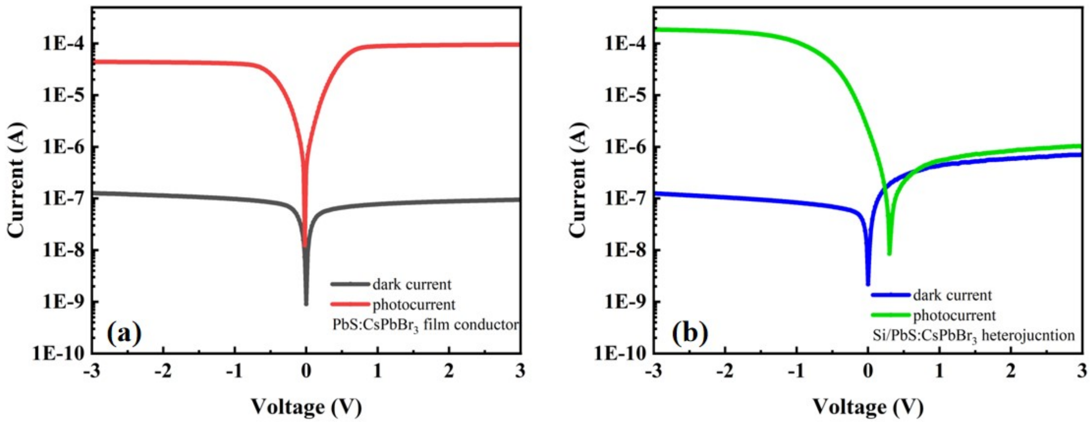

Fig. S3 I-V curves of photodetectors Ag/PbS:$CsPbBr_3$/Ag **(a)** and Si/PbS:$CsPbBr_3$/Ag **(b)** under 3.3 mW/cm^2 980 nm illumination.

I-V curves of photodetectors Ag/PbS:$CsPbBr_3$/Ag are shown in Fig. S3(a). Obviously, PbS:$CsPbBr_3$ bulk-heterojunction film shows inapparent rectifying characteristics. I-V curves of bulk-heterojunction photodetector Si/PbS:$CsPbBr_3$/Ag are shown in Fig. S2(b), the typical I-V curves imply a heterojunction is formed between Si and PbS:$CsPbBr_3$ hybrid film.

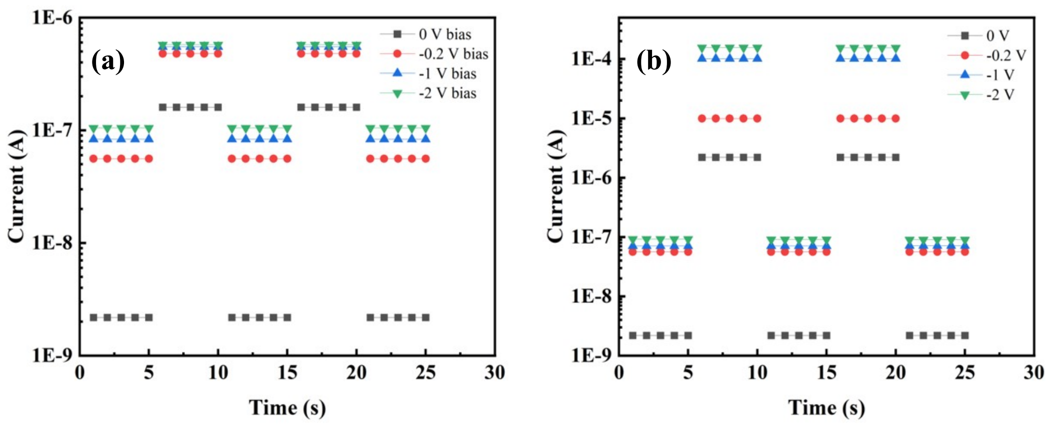

Fig. S4 I-t curves of photodetector Si/PbS:$CsPbBr_3$/Ag under 980 nm illumination with a intensity of 4.8 μW/cm^2 **(a)** and 3.3 mW/cm^2 **(b)**.

I-t curves of the bulk heterojunction photodetector Si/PbS:$CsPbBr_3$/Ag under 4.8 μW/cm^2 980 nm illumination are shown in Fig. S3(a), the photocurrent is already saturated at a small bias of -0.2 V. I-t curves of bulk heterojunction photodetectors

Si/PbS:$CsPbBr_3$/Ag under 3.3 mW/cm^2 980 nm illumination are shown in Fig. S3(b), the photocurrent saturated at -1 V.

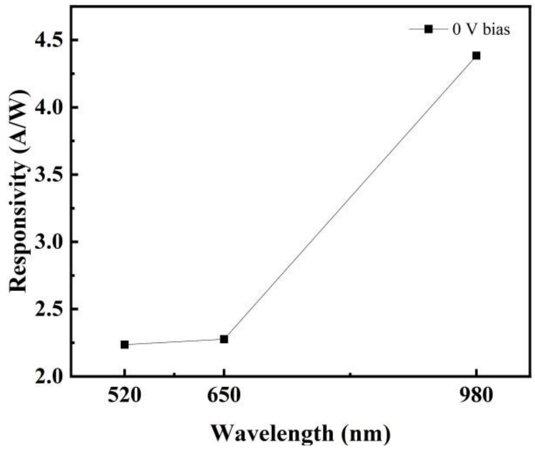

Fig. S5 Reponsivity as the function of Wavelength (520 nm, 650 nm, 980 nm)

Responsivities under different wavelengths illuminations at 0 V bias are shown in Fig. S5, however, different illuminations are with different intensities, so the curves are merely for reference.

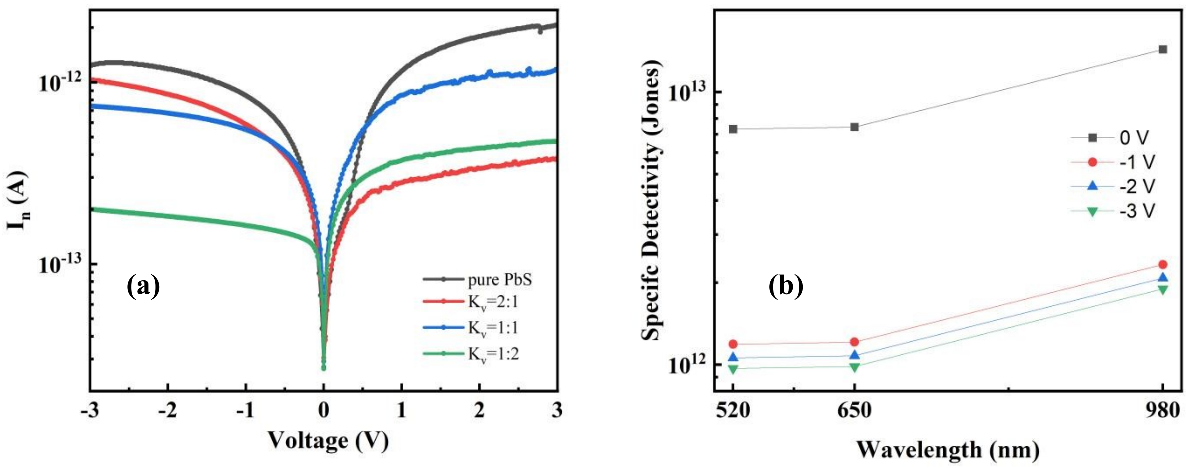

Fig. S6 noise current of bulk-heterojunction photodetectors Si/PbS:$CsPbBr_3$/Ag in which the active layer is in different volume ratio K_V under different bias **(a)**; specific detectivity based on noise current **(b)**