Supporting Information

Highly Stable and Flexible Photodetector Arrays Based on Low Dimensional $CsPbBr_3$ Microcrystals and On-paper Pencil-drawn Electrodes

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***Preparation of 2D $CsPbBr_3$ microcrystals*:** All chemicals were purchased from Aladdin and used without further purification. 2 mmol CsBr and 1 mmol $PbBr_2$ were dissolved in 15 ml DMSO as precursor. 0.15 ml precursor was mixed with 1 ml 0.2 g/ml octadecylamine/acetic acid solution under magnetic stirring. The solution was then transferred to the ultrasonic machine for 15 min treatment. After that, 15 ml toluene was added into the solution under magnetic stirring. The solution gradually turned yellow due to the formation of 2D $CsPbBr_3$. The precipitates were then extracted by two cycles of centrifugation and washing (3000 rpm × 1 min, toluene is used for washing), and were redispersed in 4 ml toluene for further characterizations and use.

***Fabrication of pristine PDs*:** Graphite-pencil (2B) drawing guided by ruler and masks was repeated 3 times to form a stripe of uniform electrode on a common paper. The masks determine the interelectrode spacing. The left and right pencil-traces are both 5 mm wide and 20 mm long. The spacing between adjacent electrodes is about 200 μm. Above 2D $CsPbBr_3$ colloid was drop-casted onto the gap of two electrodes and dried at 70 ^{o}C by hot plate. After solvent evaporation, the PDs were sent for further characterizations.

***Characterizations*:** XRD measurements were carried out with a Bruker D8 Advance XRD system. TEM and element mapping images were measured with FEI Tecnai G20 on a Cu grid. SEM images were taken by FEI field emission electron microscope, Quanta 250F. PL spectrums are measured by Cary Eclipse Fluorescence

Spectrophotometer. The adsorption spectrums are measured by SHIMADZU UV-3600 UV-VIS-NIR spectrophotometer. The time-dependent photoresponse of PD was recorded using a Tektronix DPO2014B Digital Oscilloscope. All the device characterizations were conducted at room temperature in ambient air.

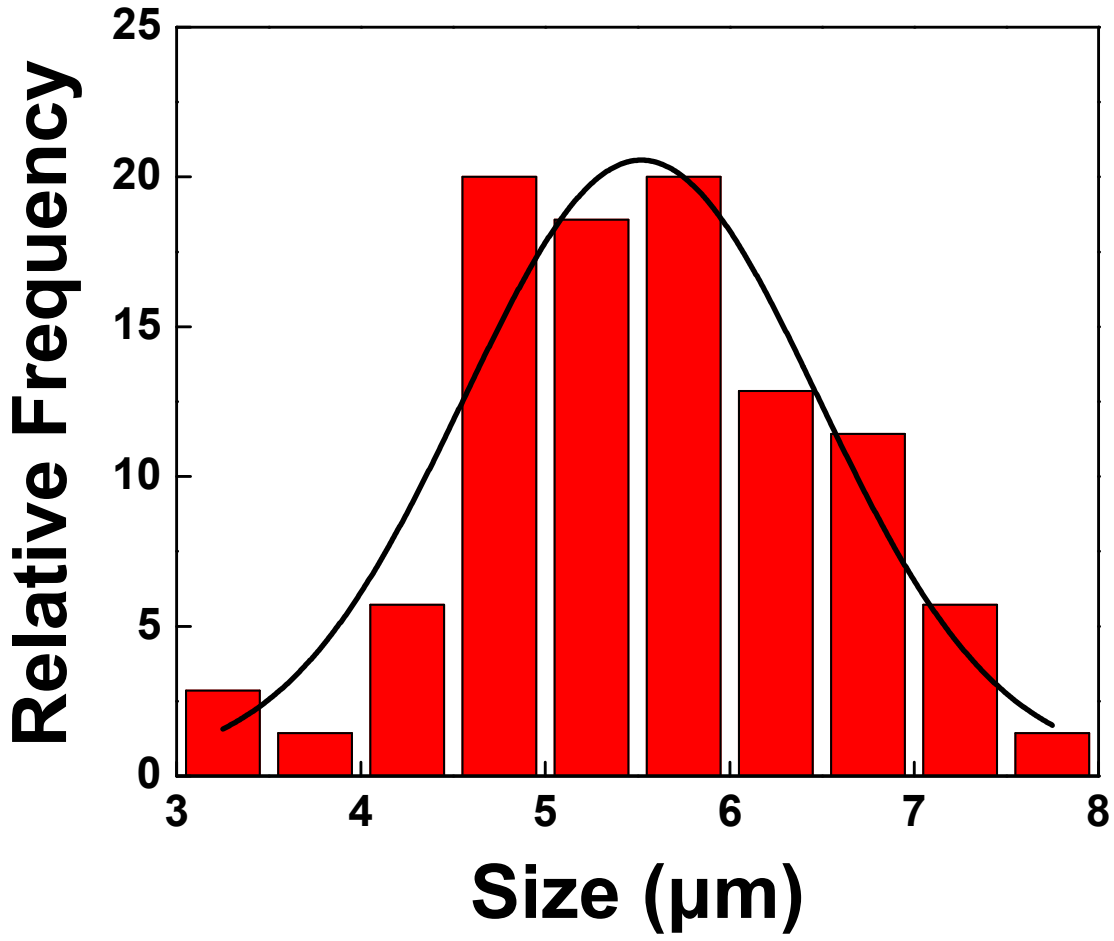

Figure S1. Size distribution of as-prepared 2D $CsPbBr_3$.

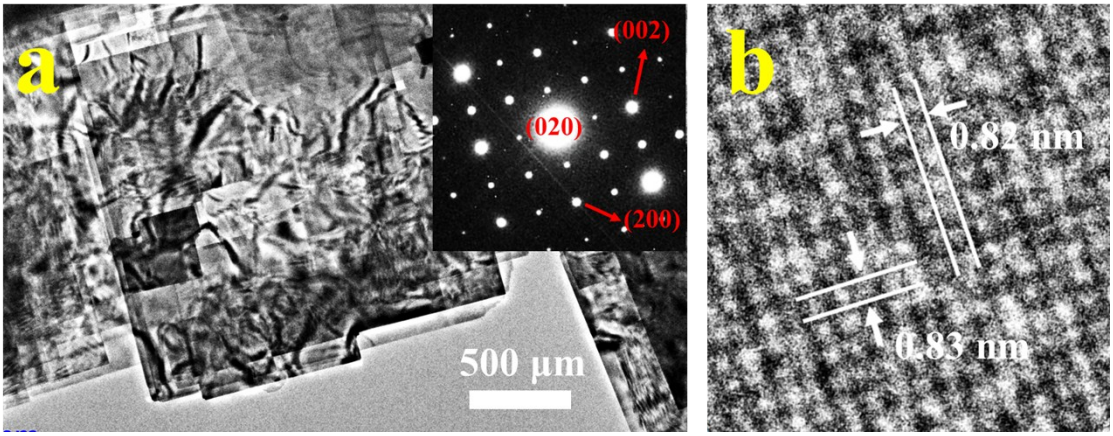

Figure S2. (a) TEM image of as-prepared 2D $CsPbBr_3$. The inset is the SAED pattern. (b) High-resolution TEM image of as-prepared 2D $CsPbBr_3$.

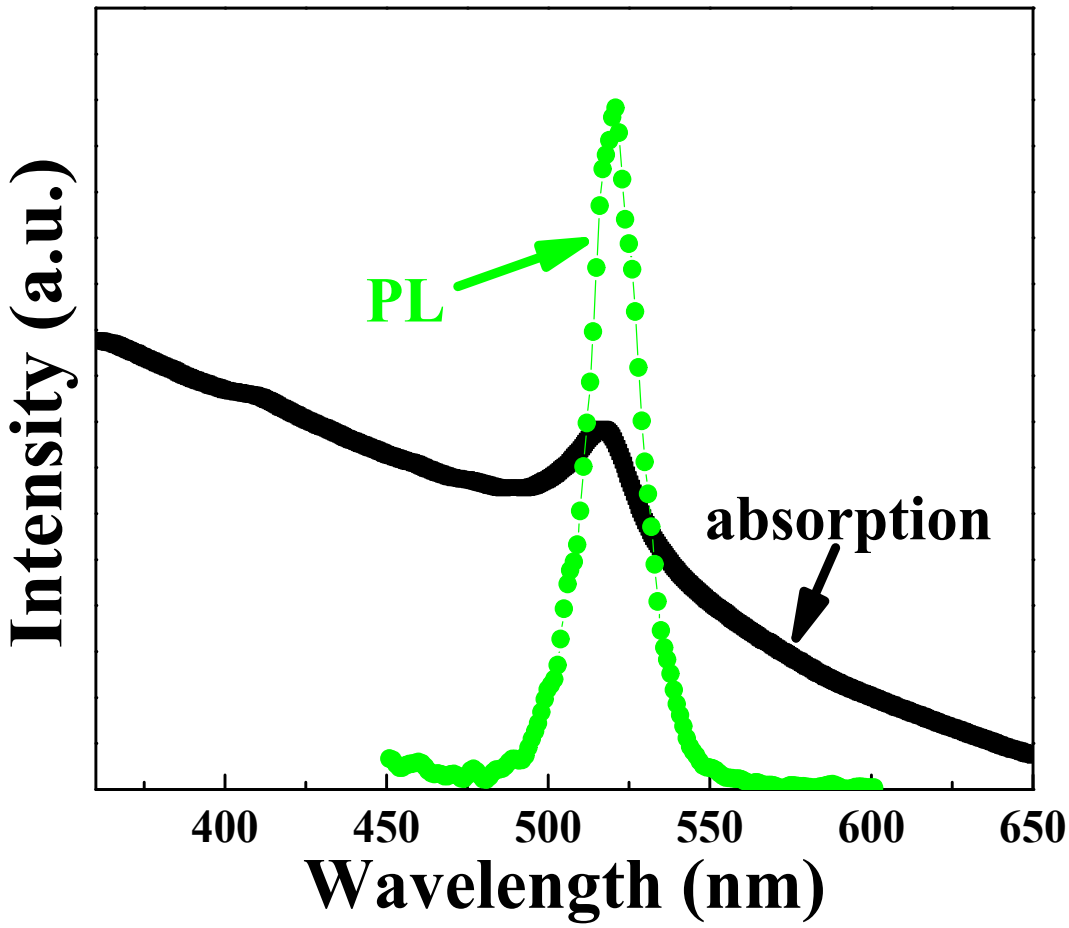

Figure S3. PL and absorption spectra of as-prepared 2D $CsPbBr_3$.

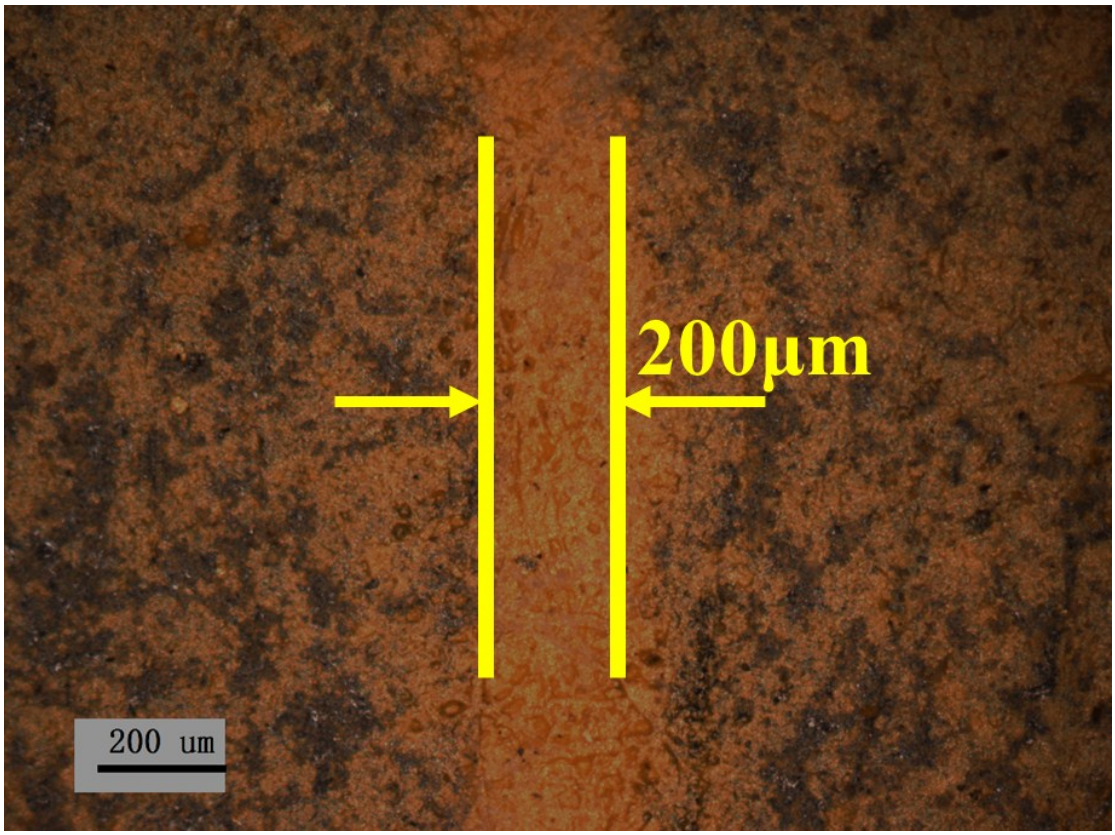

Figure S4. Optical microscope image of the interelectrode spacing.

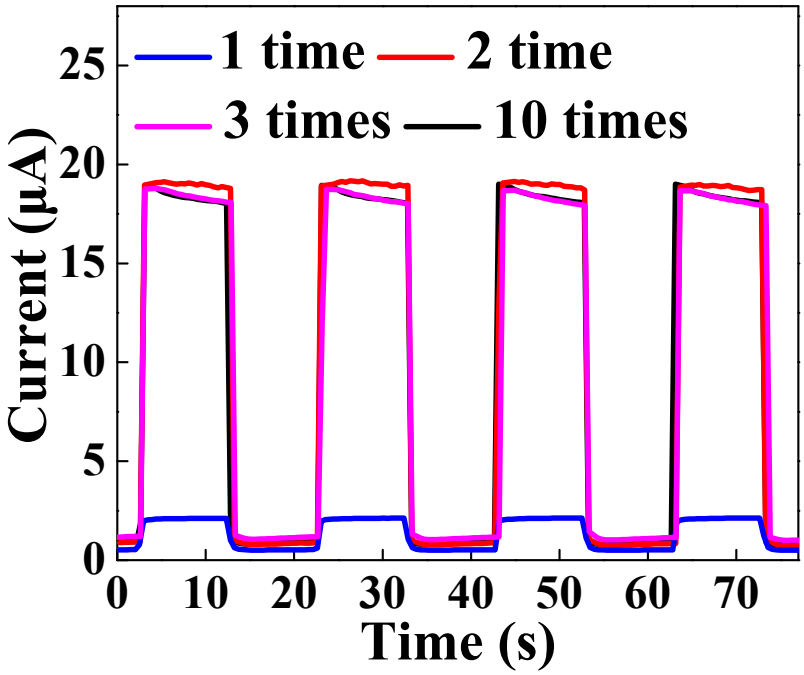

Figure S5. I-t curves of the photodetectors with different electrode drawing times. The illumination intensity is 3.63 mW/mm^2@442 nm, the bias voltage is 5V.

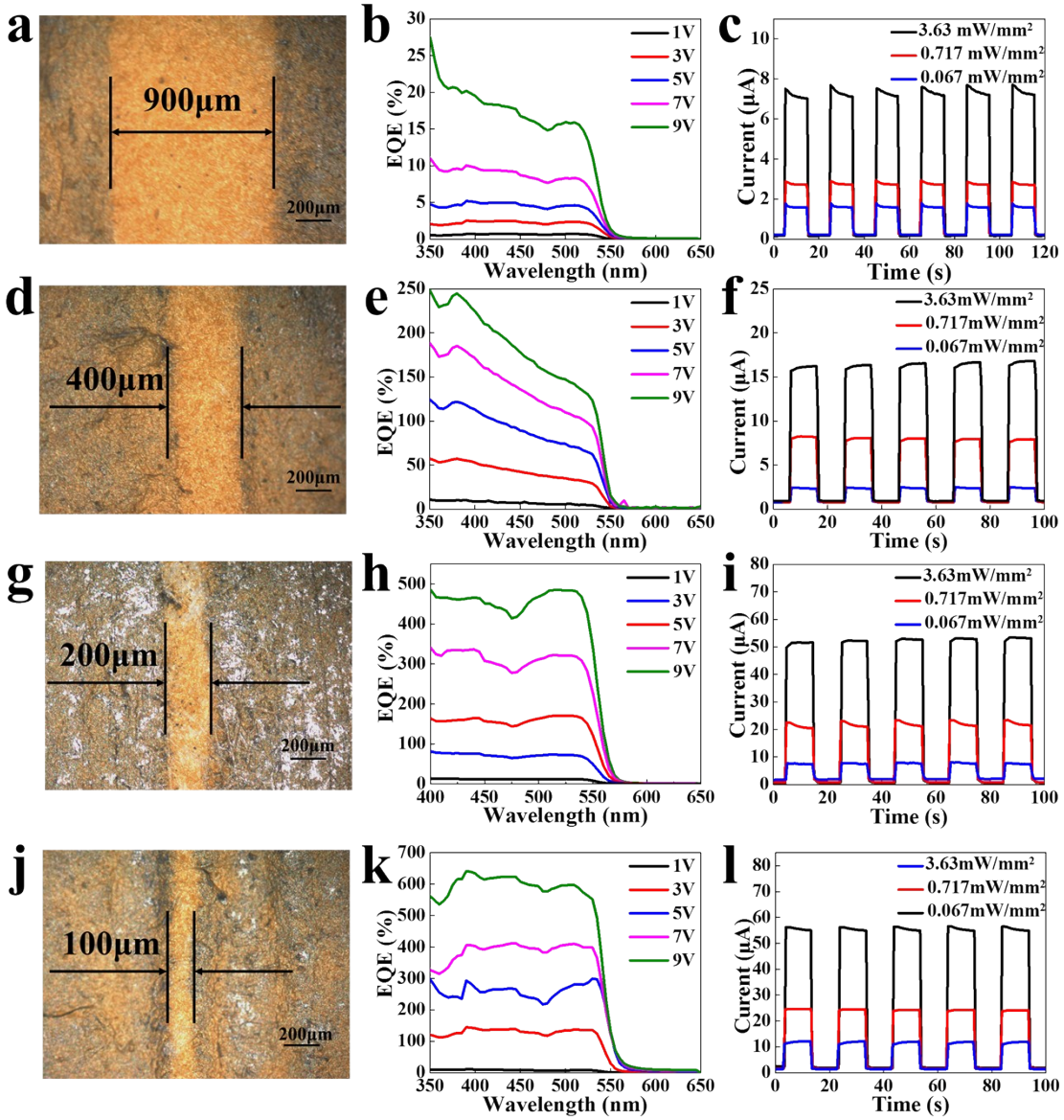

Figure S6. EQE and I-t response characterizations of photodetectors with different interelectrode spacings.

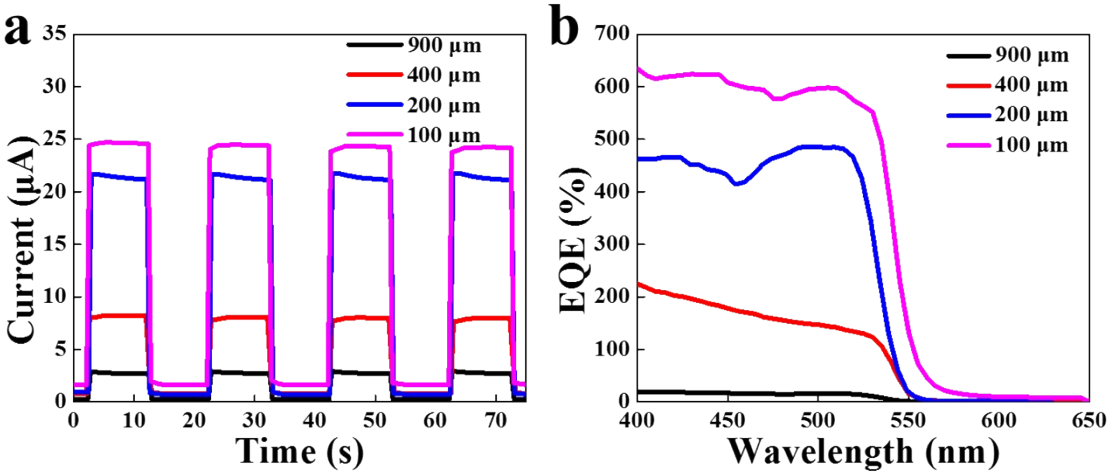

Figure S7. (a) Comparison of I-t response of the photodetectors with different interelectrode spacings. The bias voltage is 7 V, the illumination intensity is 0.717 mW/mm^2@442 nm. (b) Comparison of the EQEs.

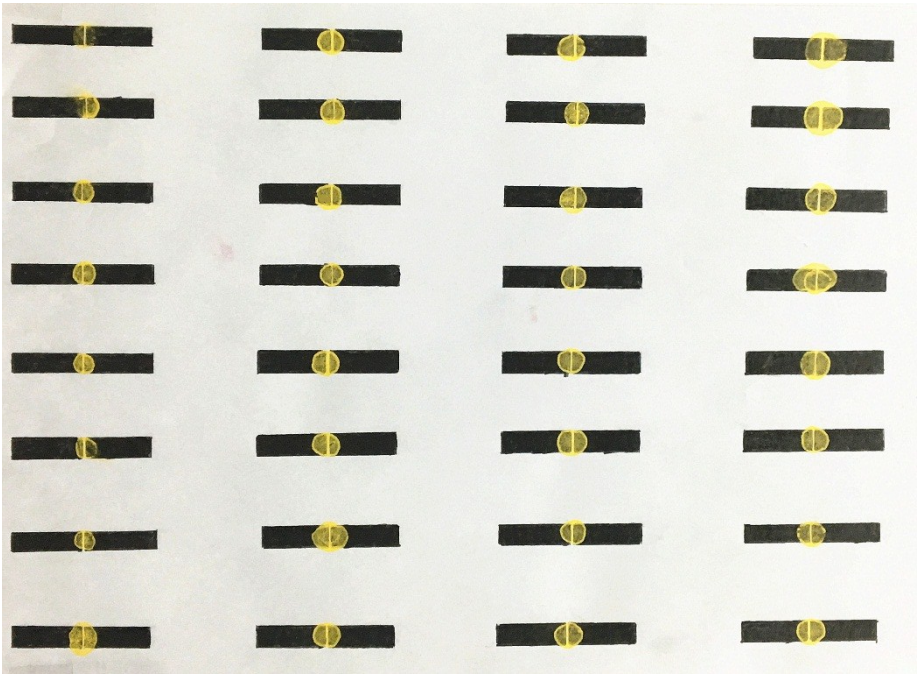

Figure S8. Photograph of integrated PD arrays.

1.80127E-6	**1.80963E-6**	**1.70768E-6**	**1.76147E-6**
1.79181E-6	**1.79269E-6**	**1.80626E-6**	**1.80797E-6**
2.73839E-7	**2.62201E-7**	**1.77052E-6**	**2.62876E-7**
2.86087E-7	**2.69041E-7**	**1.76176E-6**	**2.67722E-7**
2.62605E-7	**1.74582E-6**	**2.73051E-7**	**2.69668E-7**
2.63144E-7	**1.77793E-6**	**2.66457E-7**	**2.79019E-7**
1.77281E-6	**1.78084E-06**	**1.80655E-6**	**1.81374E-6**
1.77768E-6	**1.78411E-6**	**1.82235E-6**	**1.81878E-6**

Table S1. Photocurrents of above PDs array.