Self-driven all-inorganic perovskite microplatelet vertical Schottky junction photodetectors with tunable spectral response

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Keywords: all-inorganic perovskite, vertical structure Schottky photodetector, tunable spectral response, high temperature tolerance, weak-light sensitivity.

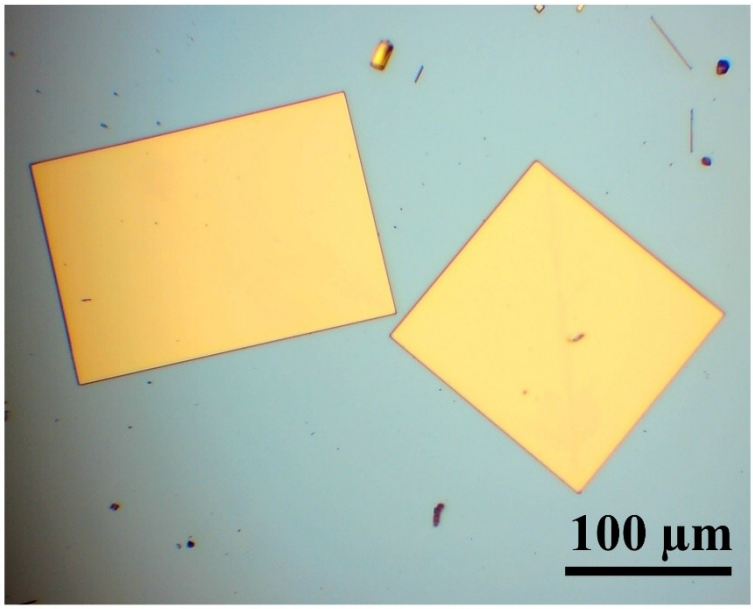

Figure S1. The optical photograph of as-grown $CsPbBr_3$ microplatelets (MPs).

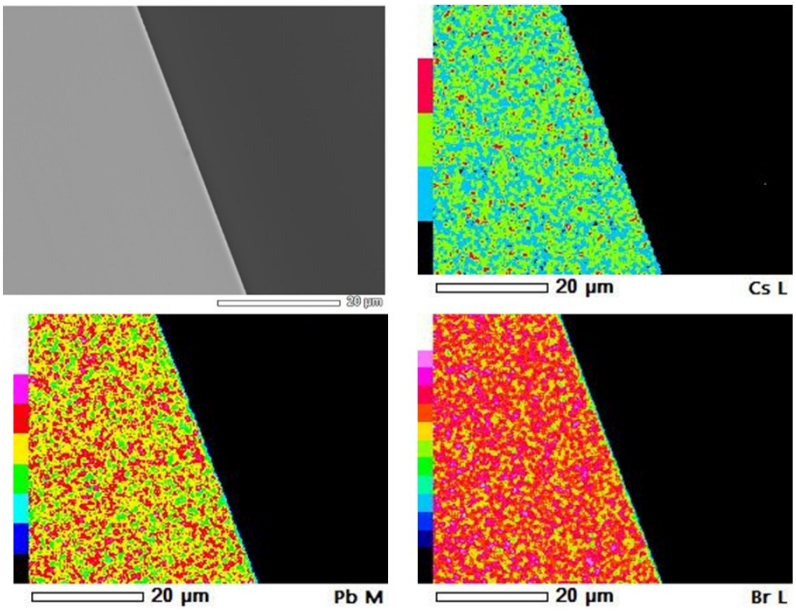

Figure S2. SEM-EDS mapping of the as-grown $CsPbBr_3$ MP.

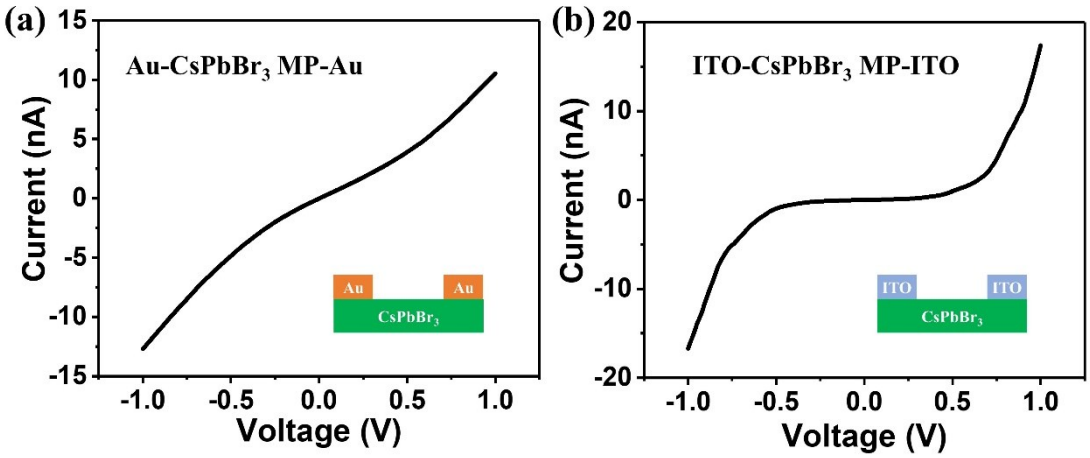

Figure S3. The *I-V* curves of the device with the structure of (a) Au/$CsPbBr_3$ MP/Au and (b) ITO/$CsPbBr_3$ MP/ITO.

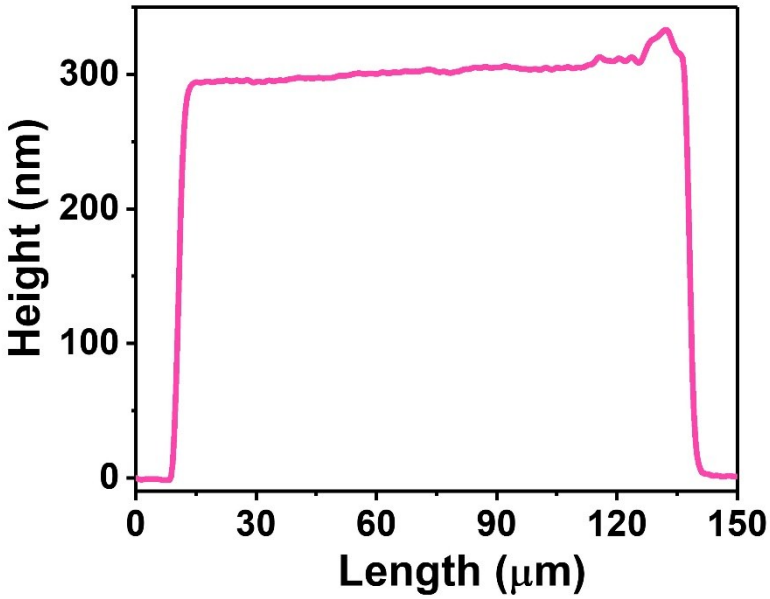

Figure S4. The height of the $CsPbBr_3$ MP measured by a step profiler.

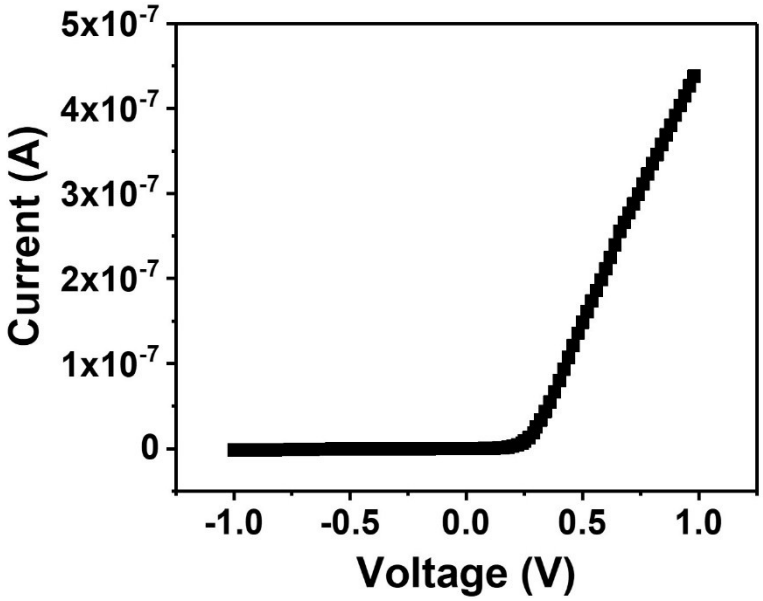

Figure S5. The dark current as a function of voltage.

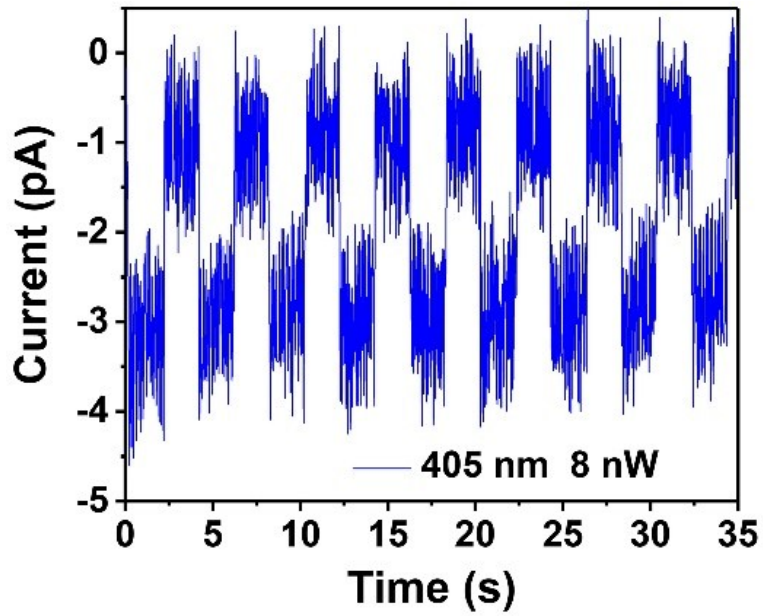

Figure S6. The *I-t* curve under 405 nm light illumination with a power of 8 nW.

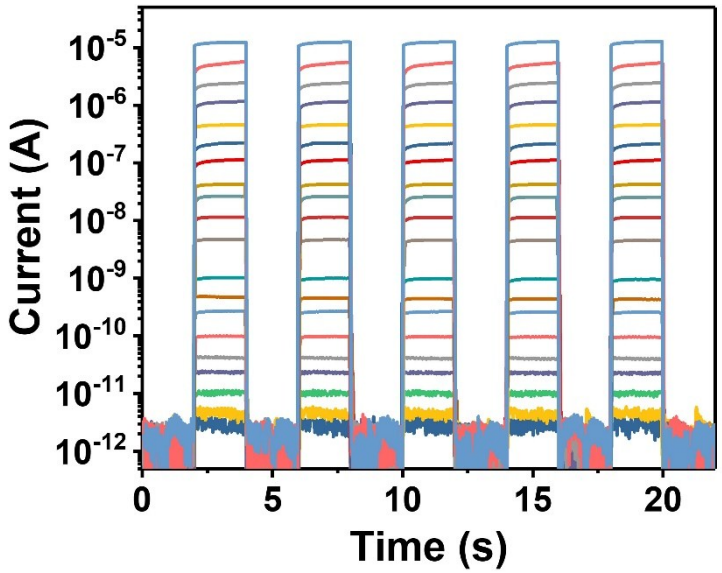

Figure S7. The *I-t* characteristics under varying light intensity illumination.

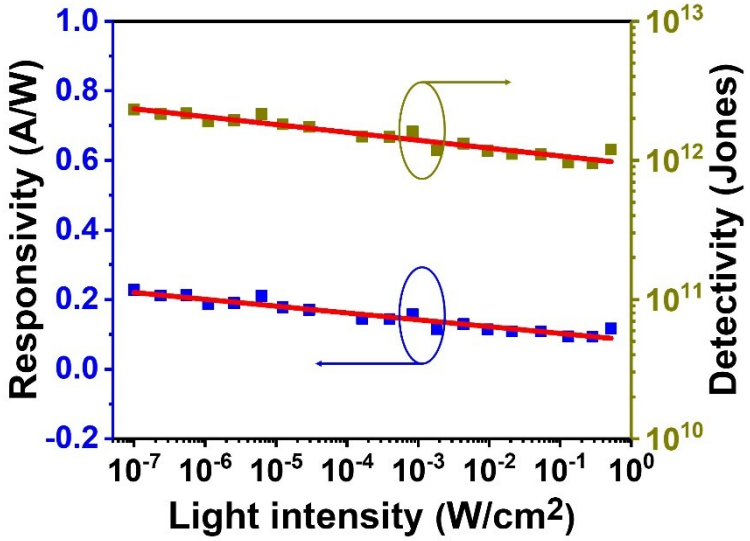

Figure S8. Photoresponsivity and specific detectivity of the photodetector versus light intensity.

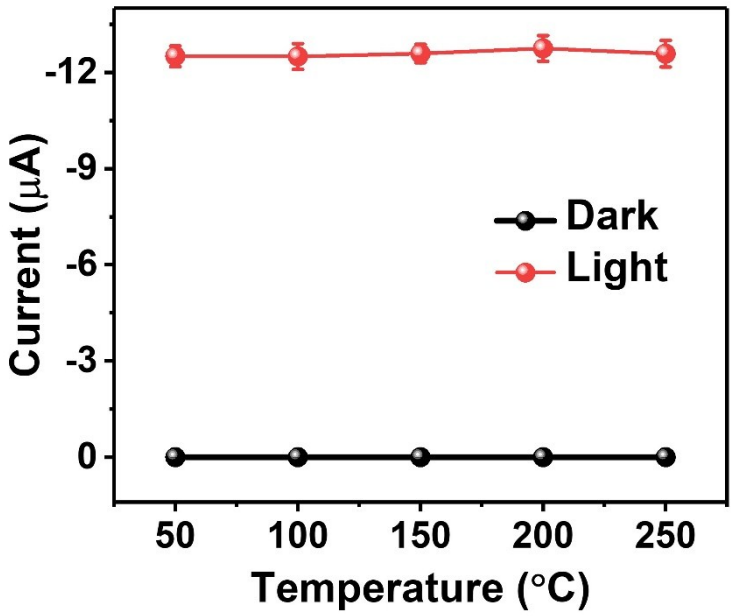

Figure S9. Dark and photocurrent as a function of the annealed temperature.

Table S1 Performance parameters of typically published all-inorganic perovskite PDs							
Device structure[1]	On/off ratio	R (A/W) @ V (V)	D^* (Jones)	Rise/fall time (ms)	LDR (dB)	ref	Wavelength selective
ITO/CsPbBr3 MCs/ITO (Lateral)	-	10^4 @ 3	10^{13}	0.5/1.6	100	s1	No
ITO/CsPbBr3 MW/ITO (Lateral)	10^2	118 @ 5	10^{12}	38/36	-	s2	No
ITO/$CsPbCl_3$ MP/ITO (Lateral)	5.6×10^3	0.45 @ 5	10^{11}	8/7	-	s3	No
ITO/$CsPbBr_3$ SC-TF/ITO (Lateral)	$>10^3$	2.5 @ 2	1.4×10^{13}	0.4/9	41	s4	Yes
Au/$CsPbBr_3$ MP/Au (Lateral)	4.6×10^3	1.33 @ 2	8.6×10^{11}	-	-	s5	No
Au/$CsPbBr_3$ SC/Au (Lateral)	100	0.028 @ 5	1.8×10^{11}	< 100	-	s6	No
Au/$CsPbBr_3$ NWs/Au (Lateral)	> 150	0.007 @ 5	1.7×10^{11}	10/22	-	s7	No
Au/$CsPbBr_3$ MSC/Au (Lateral)	988	0.025 @ 6	3.67×10^{12}	170/160	-	s8	No
Au/$CsPbBr_3$ MP/Au (Lateral)	2.72×10^4	1.74 @ 5	2.41×10^{12}	55/20	-	s9	No
Pt/$CsPbBr_3$ SC/Au (Vertical)	10^5	0.028 @ 0	1.7×10^{11}	230/60	-	s10	No
ITO/SnO2/$CsPbBr_3$ NWs+PMMA/ PTAA/Au (Vertical)	10^6	0.3 @ 0	10^{13}	0.4/0.43	135	s11	No
ITO/SnO2/$CsPbBr_3$ MCs/spiro-OMeTAD/Au (Vertical)	1.3×10^5	0.075 @ 0	2.1×10^{12}	0.14/0.12	113	s12	No
Ni/GaN/$CsPbBr_3$ MCs/ZnO/Au (Vertical)	10^5	0.0895 @ 0	1.03×10^{14}	0.1/0.14	-	s13	No
Au/$CsPbBr_3$ MP/ITO (Vertical)	$> 10^6$	0.208 @ 0	10^{12}	0.075/0.07	137	This work	Yes
1.SC-TF: single crystal thin film; MP: microplatelet; SC: bulk single crystal; MC: microcrystal; NW: nanowire; MSC: microrod single crystal.							

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