Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supplementary Material

Self-powered p-CuBr/n-Si Heterojunction Photodetector Based on Vacuum Thermally Evaporated High-quality CuBr Films

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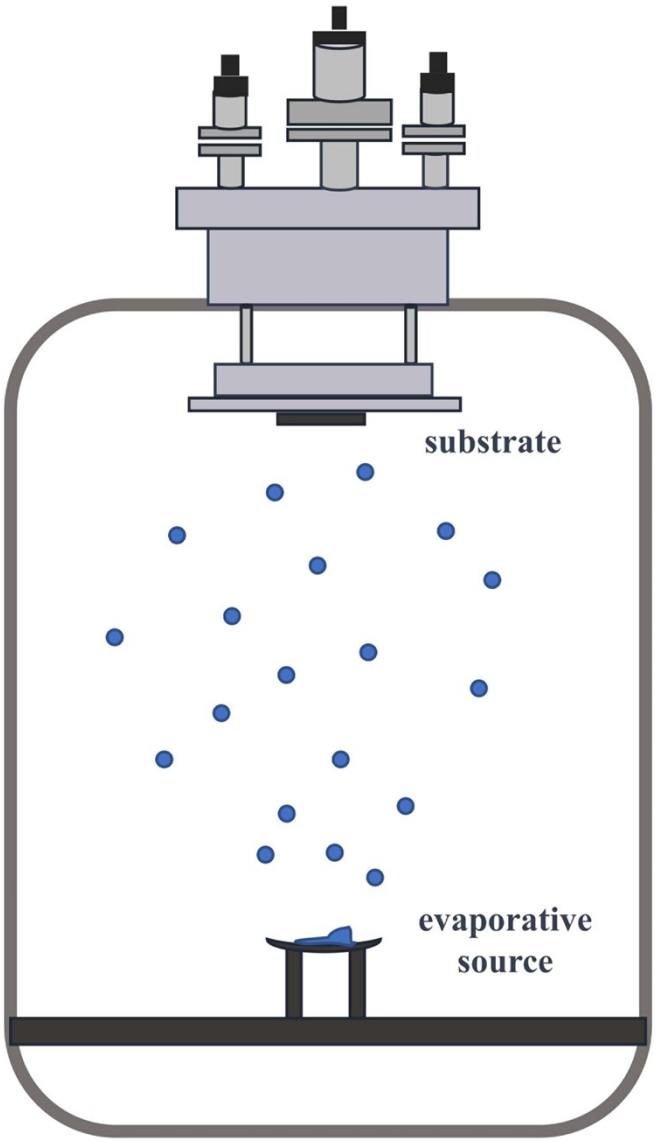

Fig. S1 Schematic Diagram of Vacuum Thermal Evaporation.

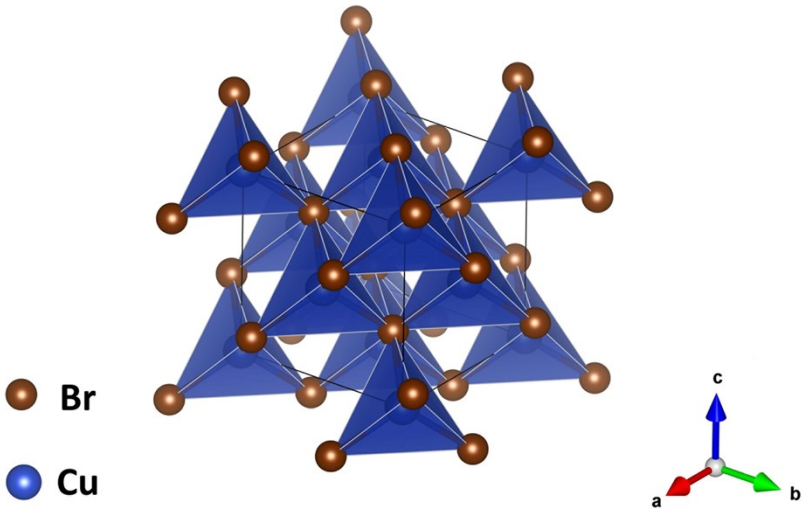

Fig. S2 Schematic diagram of CuBr crystal structure.

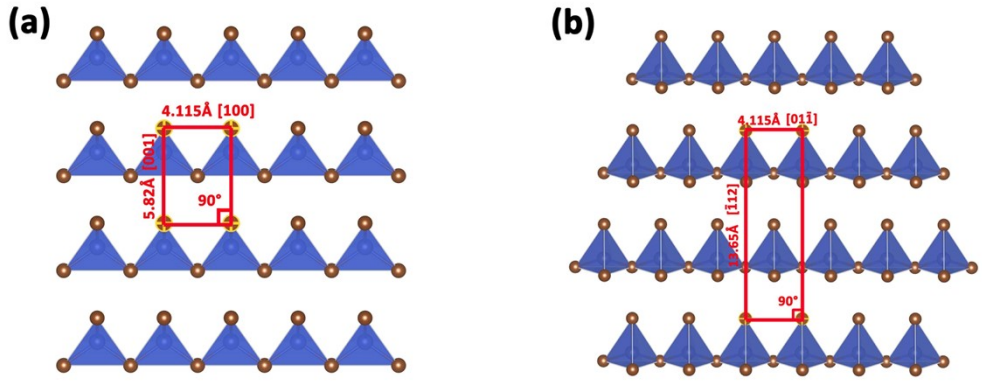

Fig. S3 (a)CuBr (220) crystal plane, (b) CuBr(311) crystal plane.

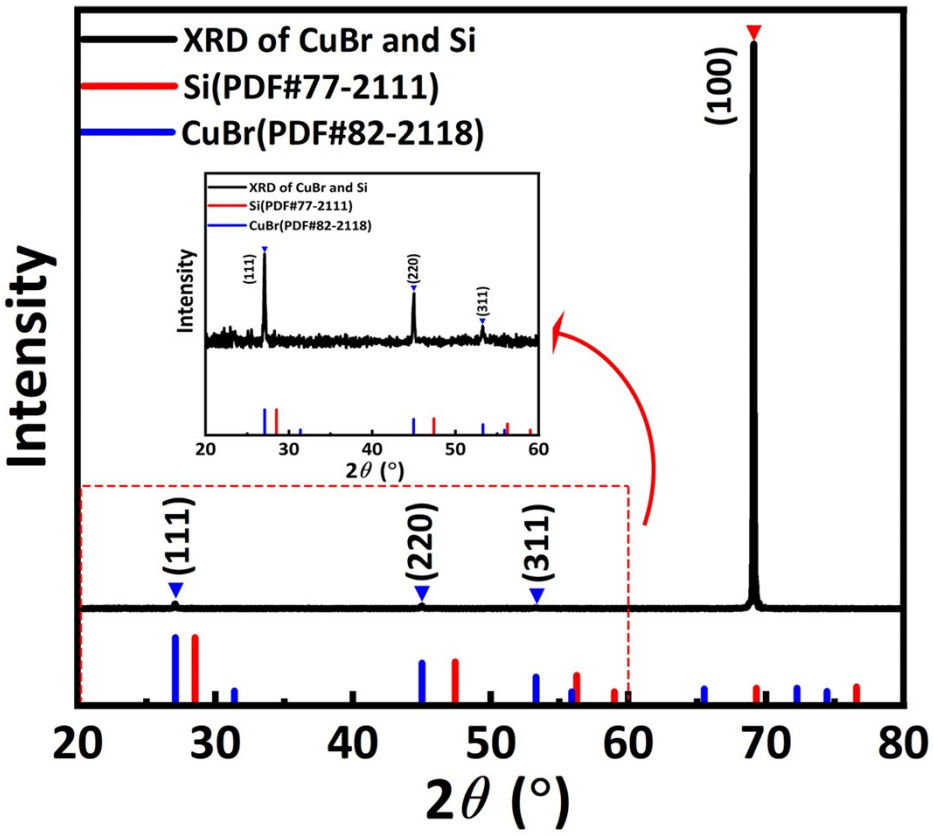

Fig. S4 XRD patterns of CuBr films with unshielded Si signals.

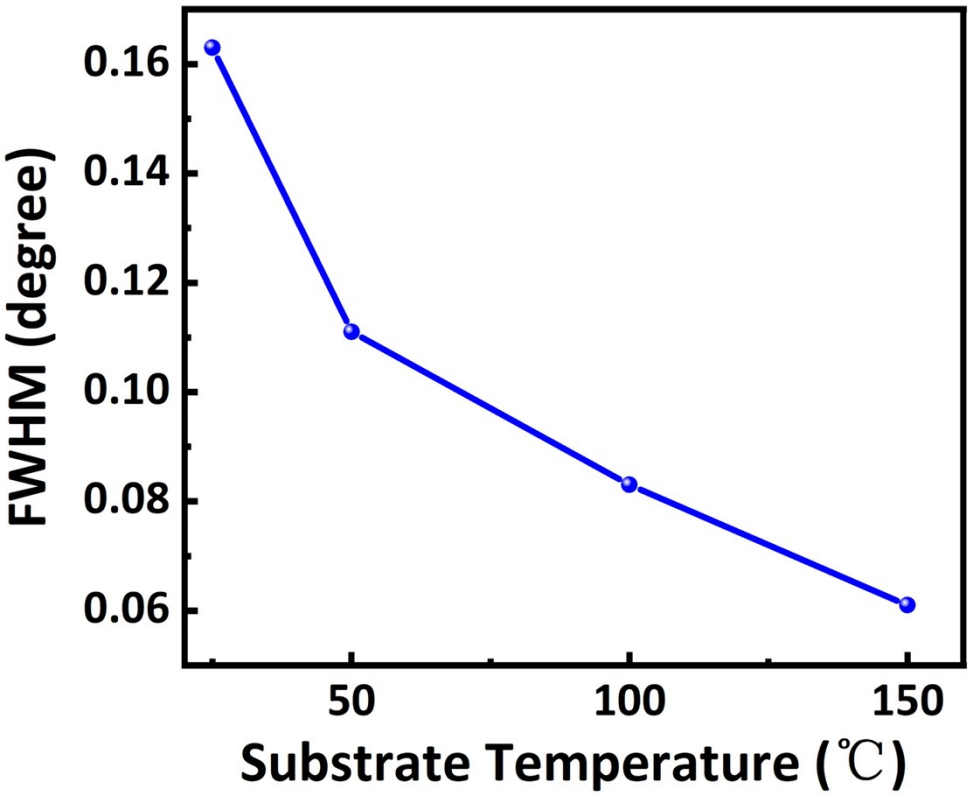

Fig. S5 the FWHM of (111) diffraction peaks at different substrate temperatures.

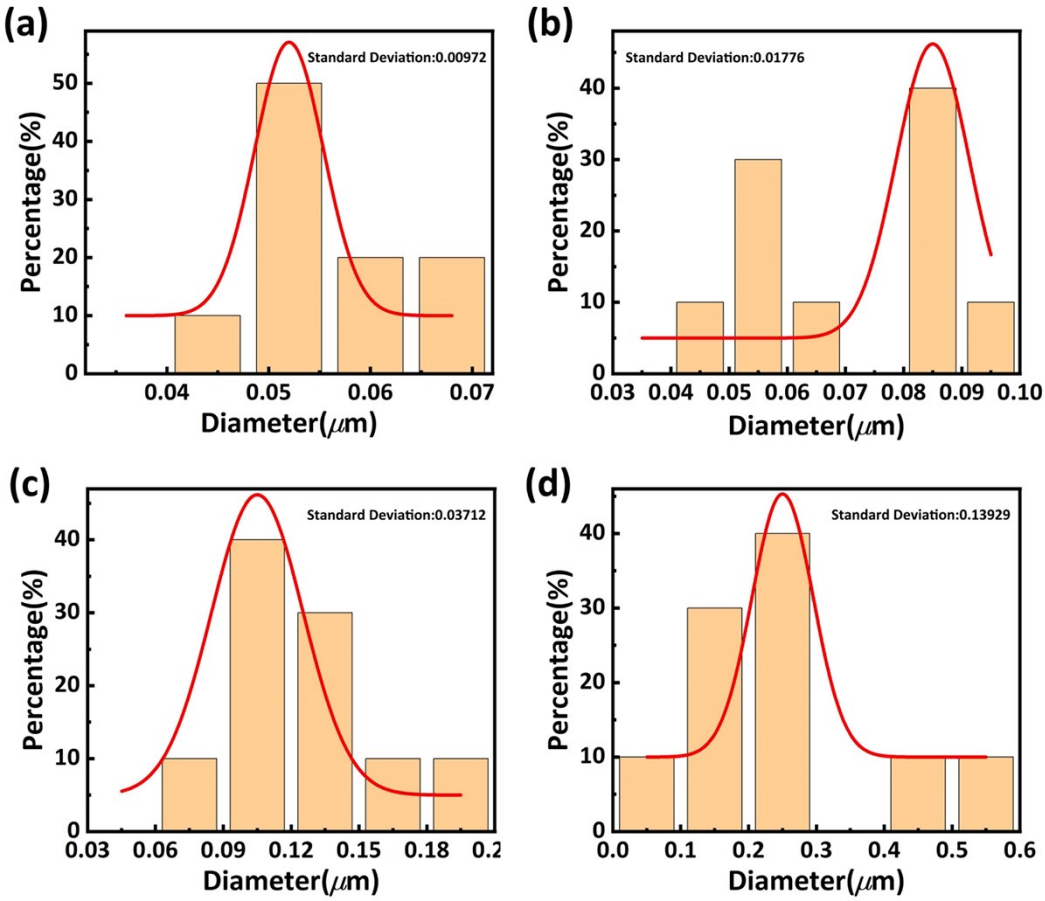

Fig. S6 Histogram of grain size at different substrate temperatures. (a)RT,(b) 50℃,(c)100℃,(d)150℃.

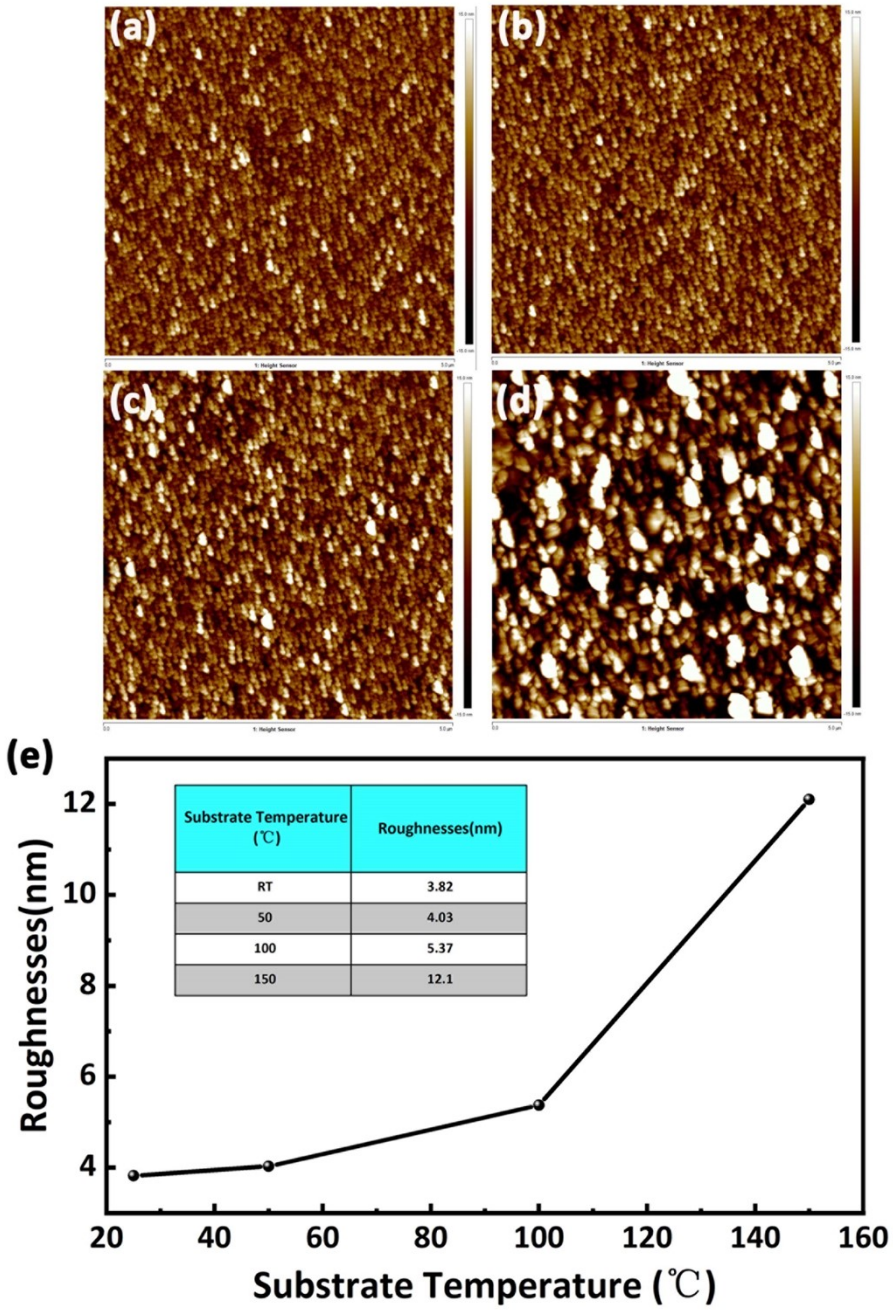

Fig. S7 AFM images of CuBr films. (a)RT,(b) 50℃,(c)100℃,(d)150℃,(e) Roughness at different substrate temperatures.

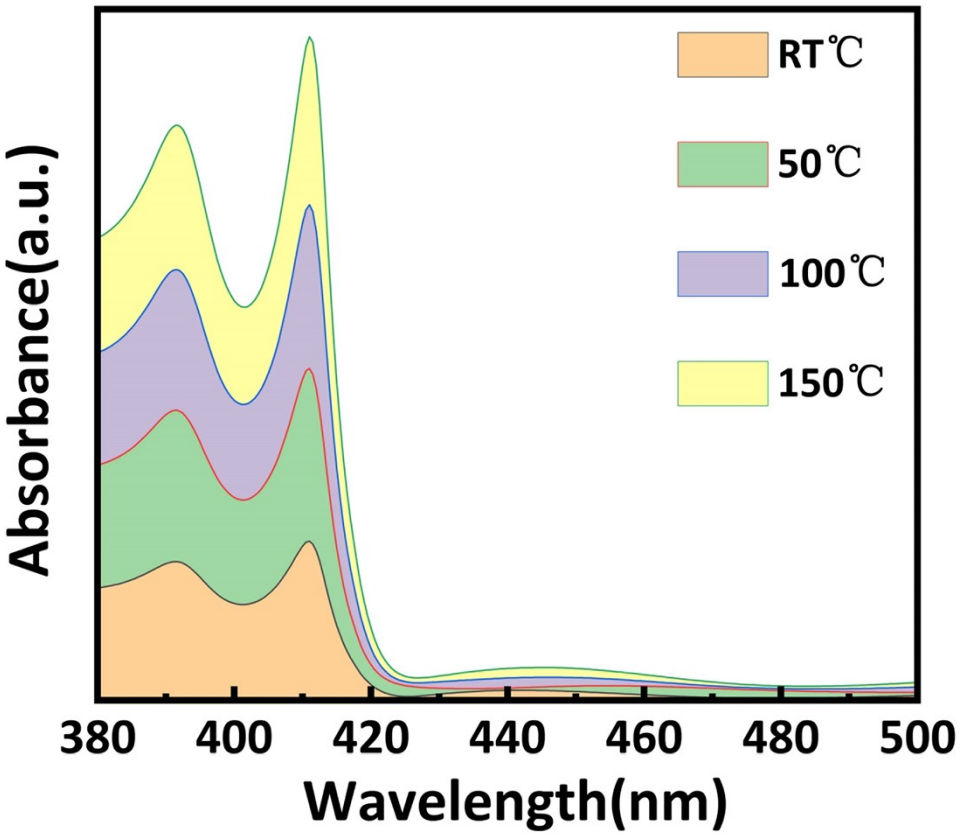

Fig. S8 Absorption spectra of CuBr thin films grown at different substrate temperatures.

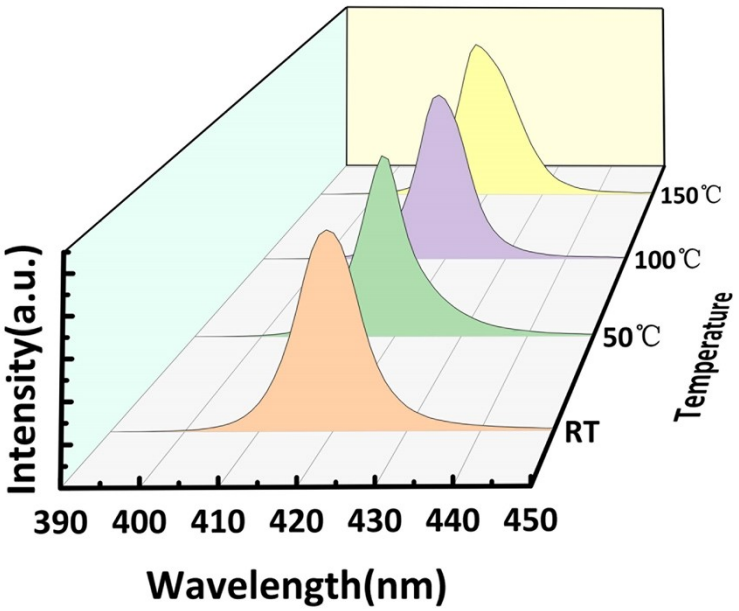

Fig. S9 Photoluminescence spectra of CuBr film grown at different substrate temperatures.

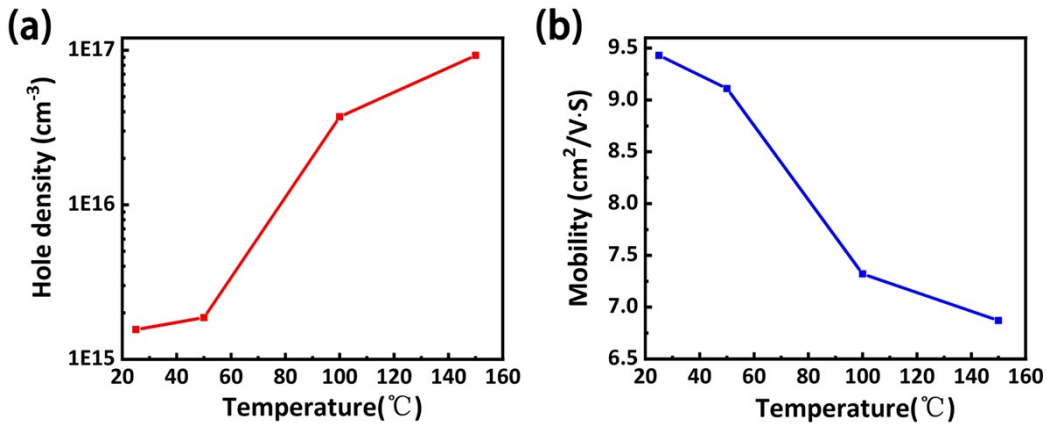

Fig. S10 CuBr at different substrate temperatures (a) hole concentration,(b) mobility.

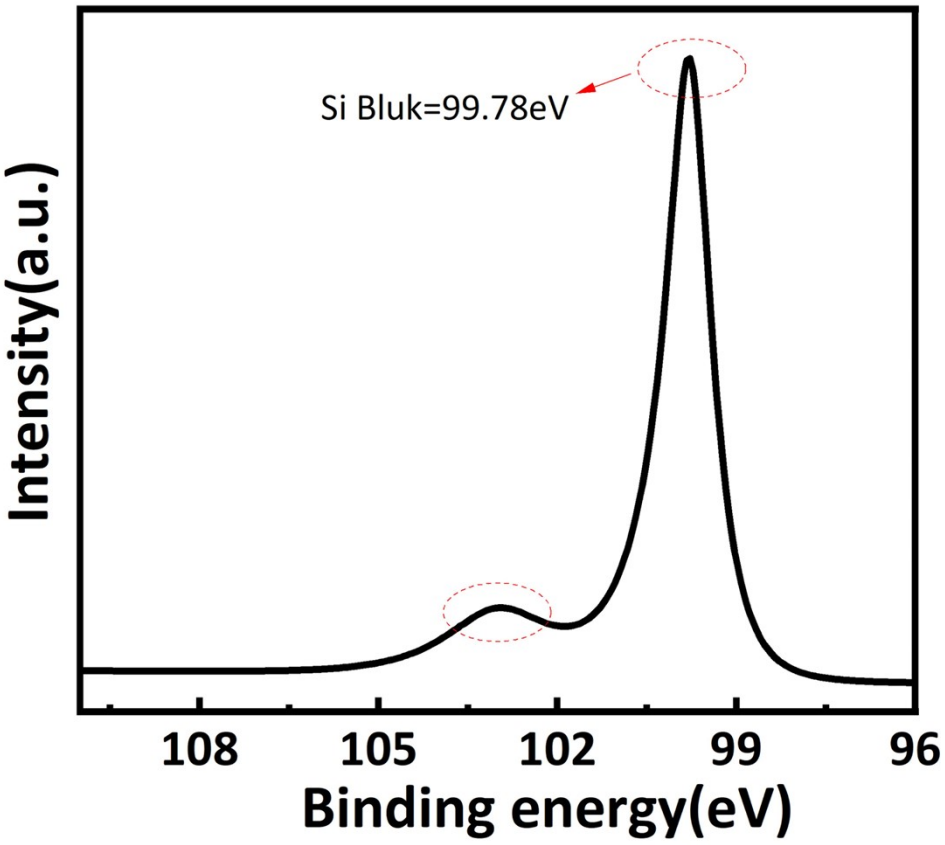

Fig. S11 Si 2p spectrum measured by XPS

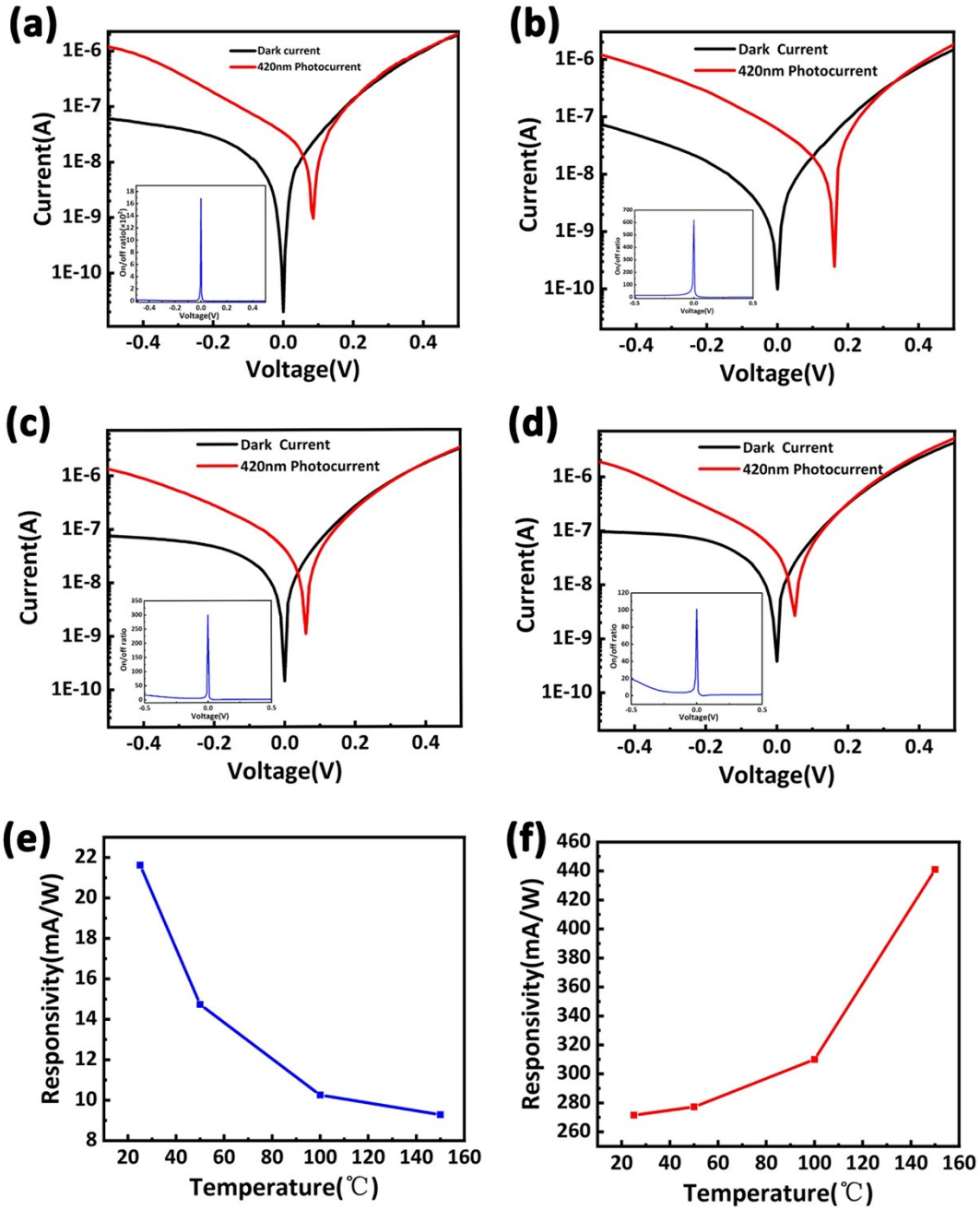

Fig. S12 (a) light-dark current and switching ratio at RT, (b) light-dark current and switching ratio at 50 ℃, (c) light-dark current and switching ratio at 100 ℃, (d) light-dark current and switching ratio at 150 ℃; (e) responsivity versus substrate temperature at 0V, and (f) responsivity versus substrate temperature at -0.5V

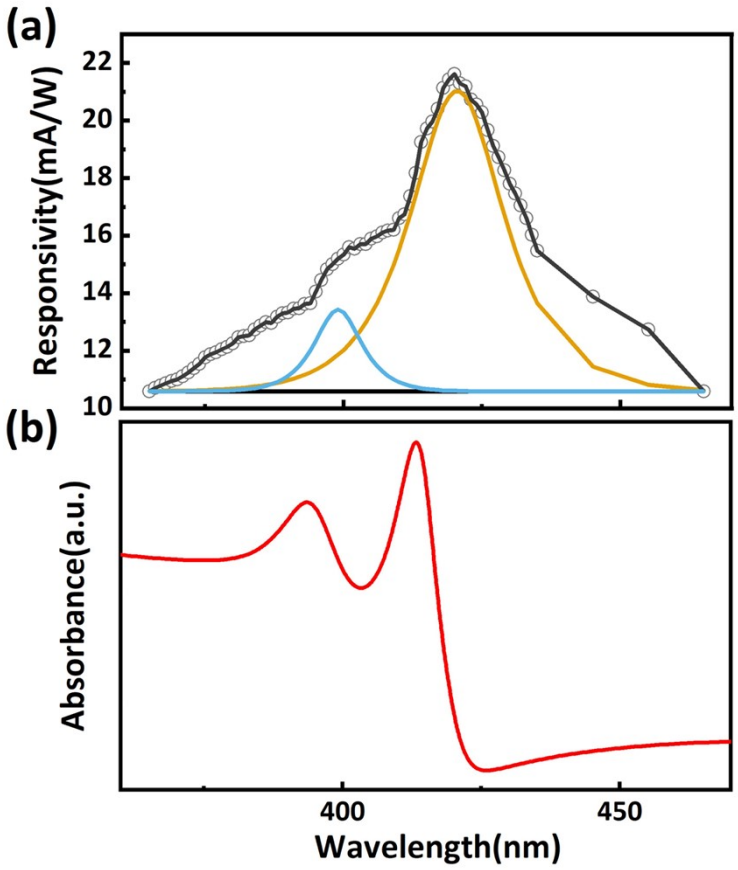

Fig. S13 (a) Spectral responsivity of CuBr/n-Si device at zero bias voltage,(b) UV-Visible absorption spectrum of CuBr thin film deposited under RT

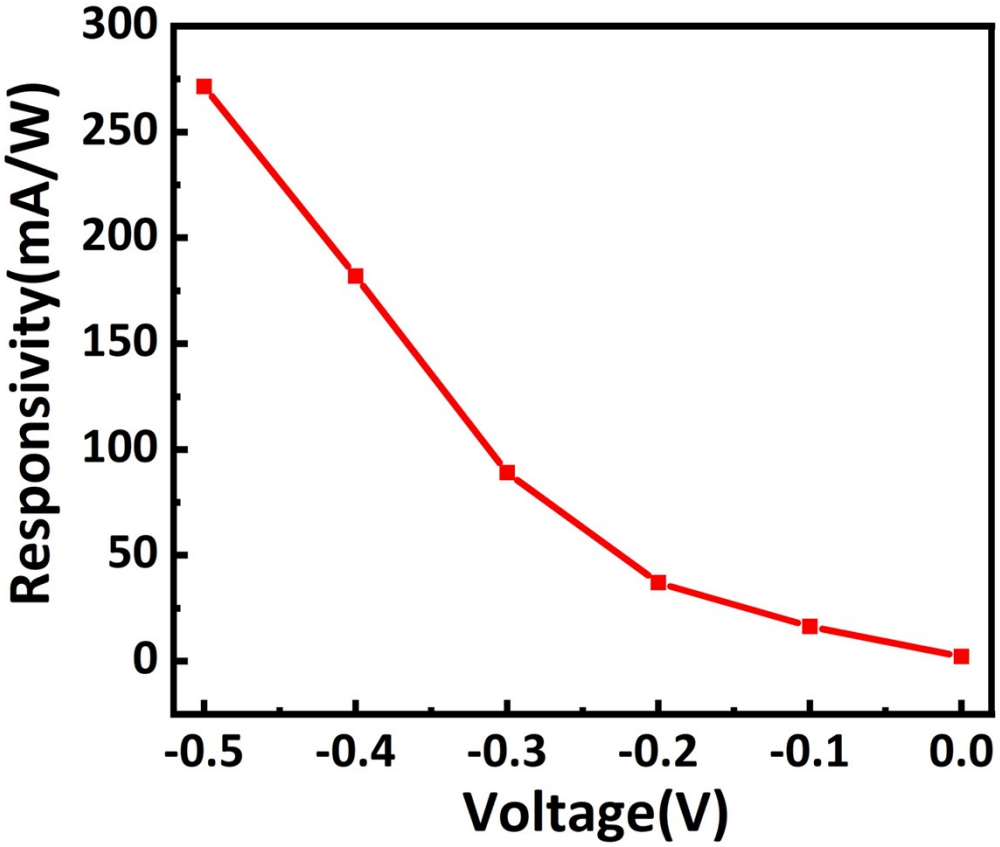

Fig. S14 Device responsiveness at different bias voltages

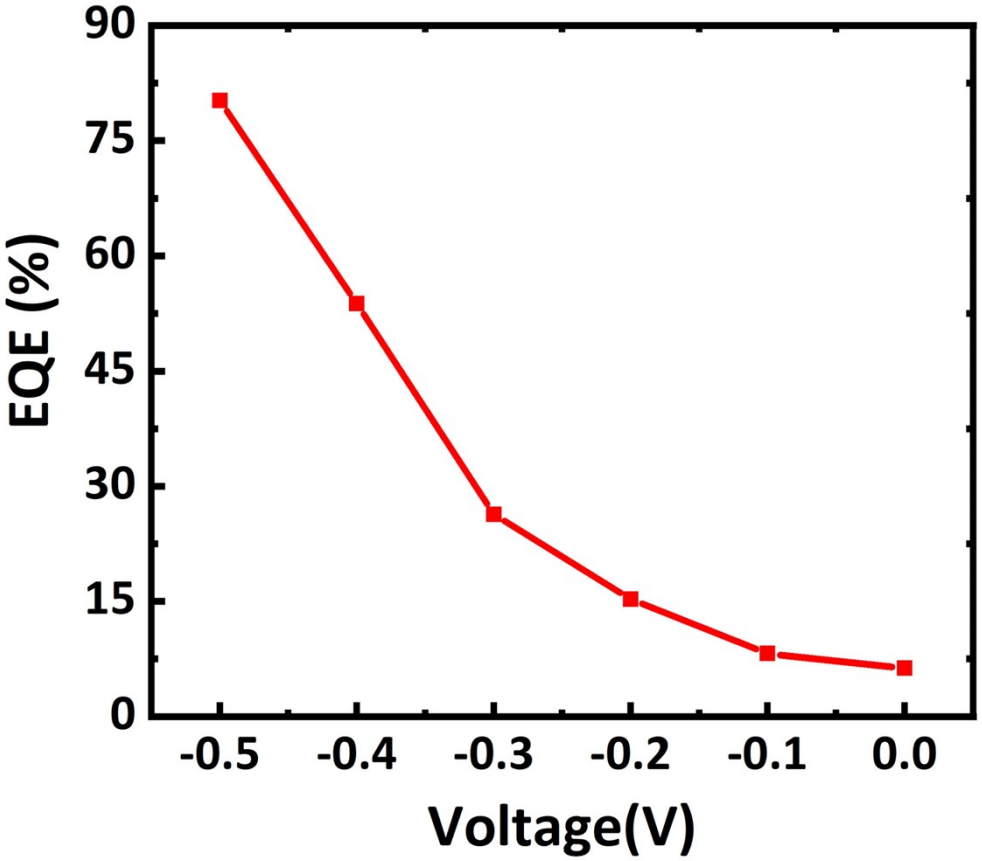

Fig. S15 EQE under different biases.

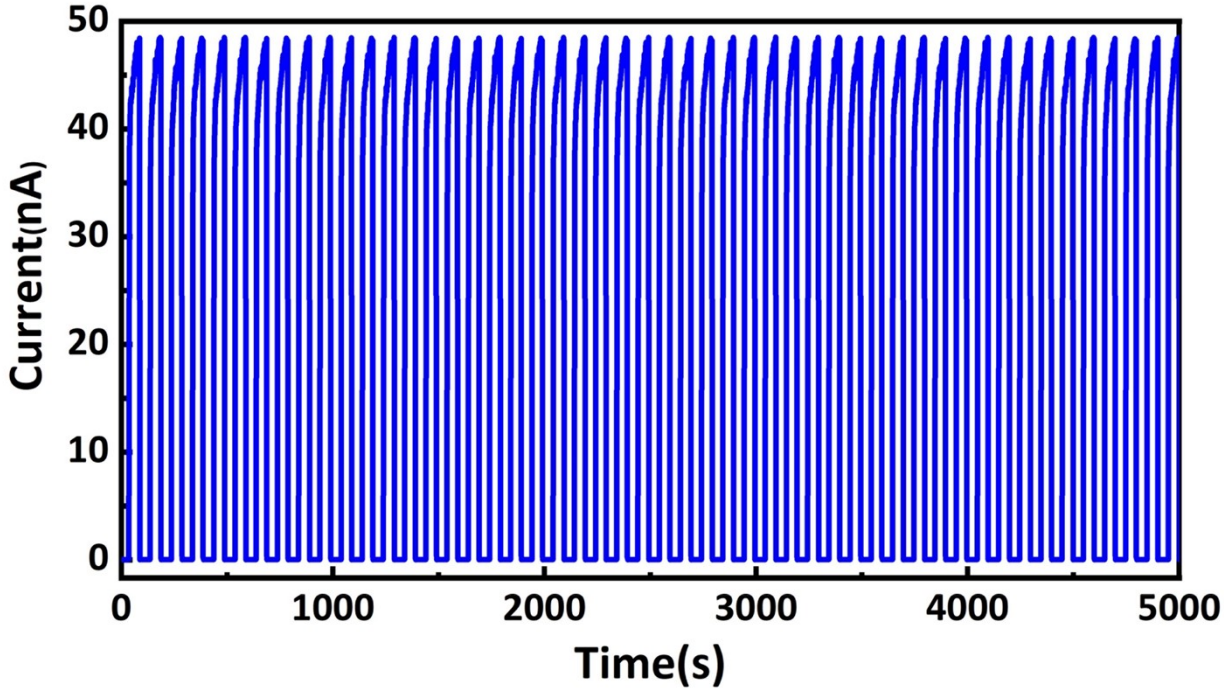

Fig. S16 The current-time curve of the device over 50 cycles at 0V bias.

Table. S1 Comparison of key parameters of CuBr or CuI based photodetectors

Device structure	Wavelength (nm)	R(A/W)	D* ($\times 10^{12}$ Jones)	Bias(V)	EQE	On/off ratio	Rise/decay time(ms)	Ref.
CuBr/Ag	345	3.17	0.14	0	1126%	——	48/32	1
CuI/ZnO	385	0.235	1.23	-5	——	5500	80/84	2
CuI/Si	365	0.00126	——	0	—	80.8@-3V	——	3
CuI/GaN	360	0.0755	1.27	0	——	2320	160/158	4
ZnONRs/CuI	380	0.08684	——	0	-2V/ 14388%	——	110/110	5
CuI/a-IGZO	365	0.0002~ 0.0003	——	0	——	130~350	——	6
TiO_2/Si	365	26	1.31	-4	——	——	0.1276/0.12 03	7
CuBr/Si	420	0.0216	0.53	0	6.3%	1689	18.6/12.8	This work

References

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