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

Supporting Information for

Bandgap-Tuned Barium Bismuth Niobate Double Perovskite for Self-Powered Photodetector with Full-Spectrum Response

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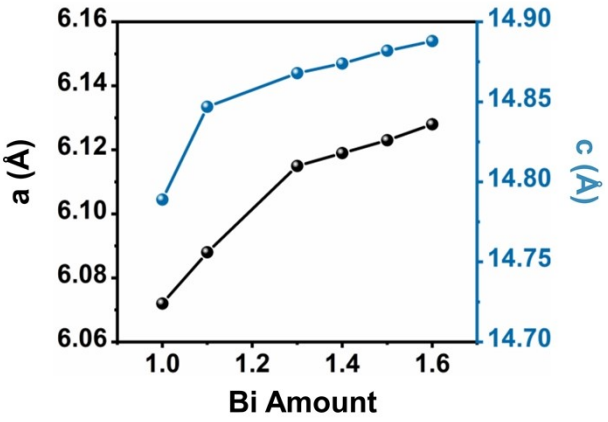

Fig. S1 Lattice constants change with Bi:Nb ratio.

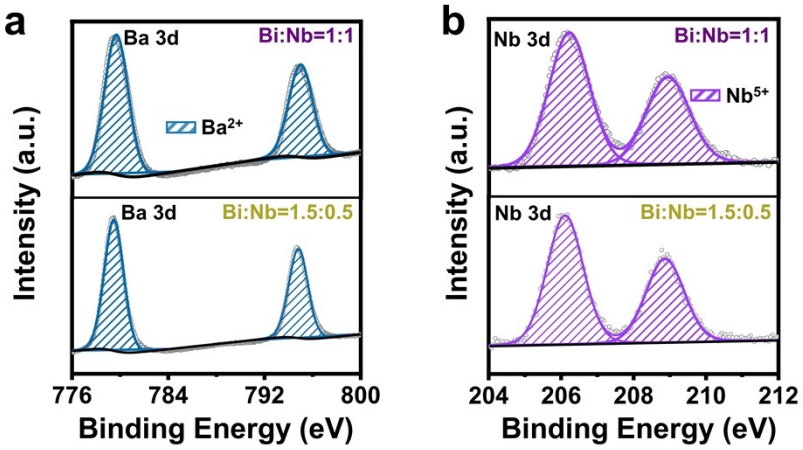

Fig. S2 XPS spectra of Ba 3d (a) and Nb 3d (b) for Ba_2BiNbO_6 and $Ba_2Bi_{1.5}Nb_{0.5}O_6$.

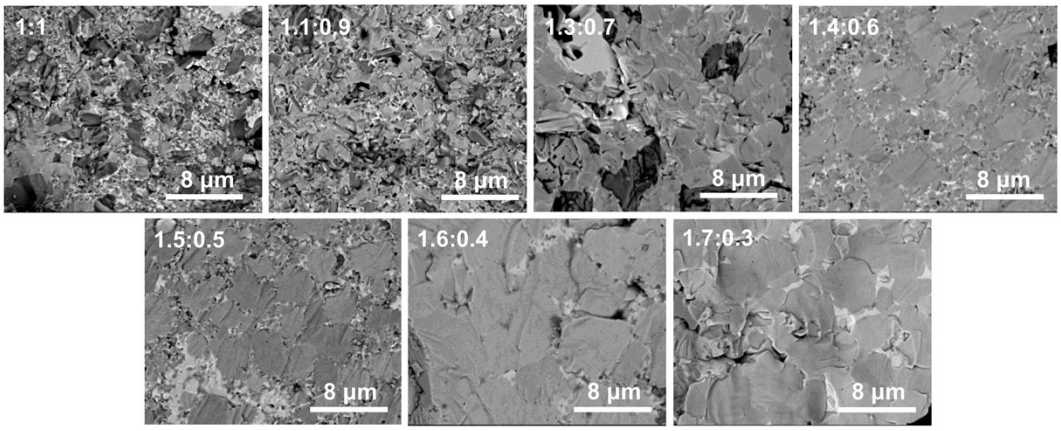

Fig. S3 SEM images of BBNO ceramics with different Bi:Nb ratios.

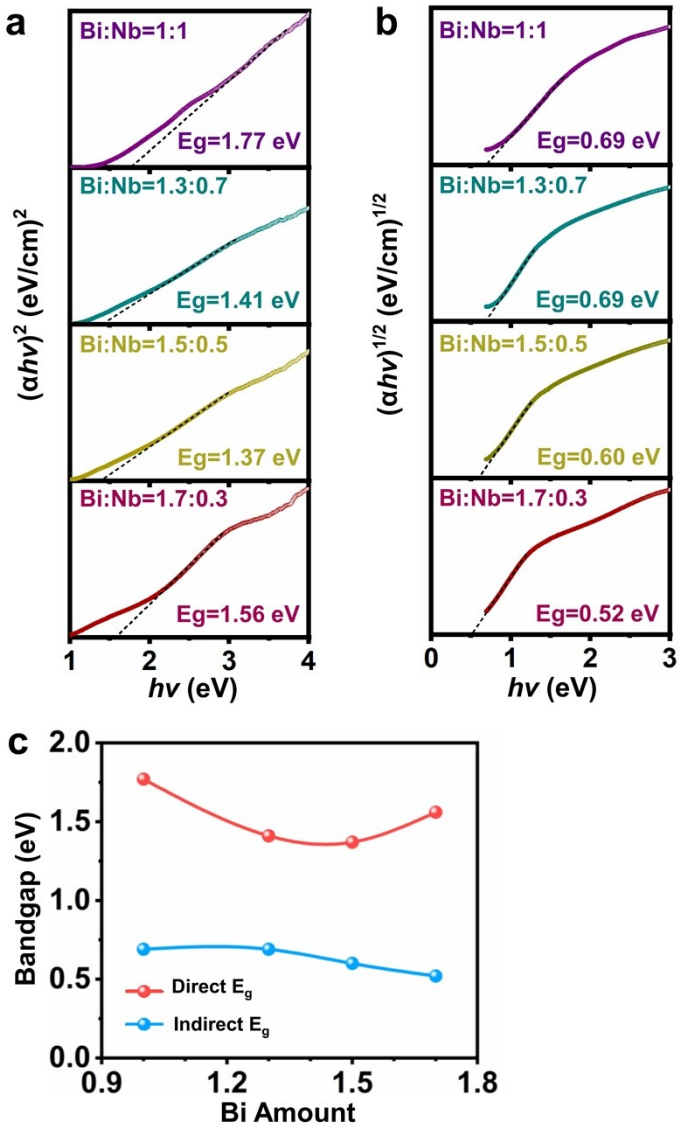

Fig. S4 ($\alpha h\upsilon$)^2 plot (a), ($\alpha h\upsilon$)$^{1/2}$ plot (b) and bandgap change (c) of BBNO with different Bi:Nb ratios.

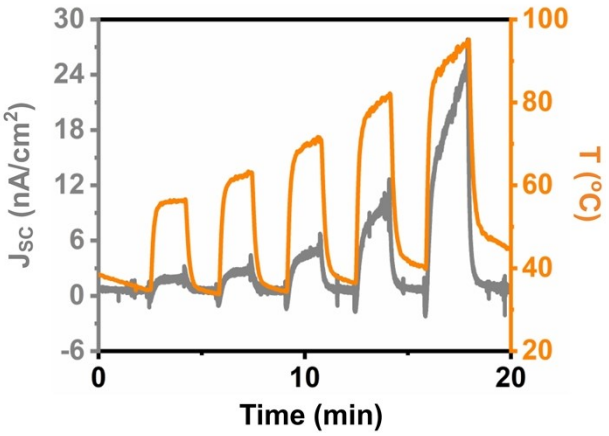

Fig. S5 Output current of ITO/BBNO/Ag (Bi:Nb=1.5:0.5) under periodically heating.

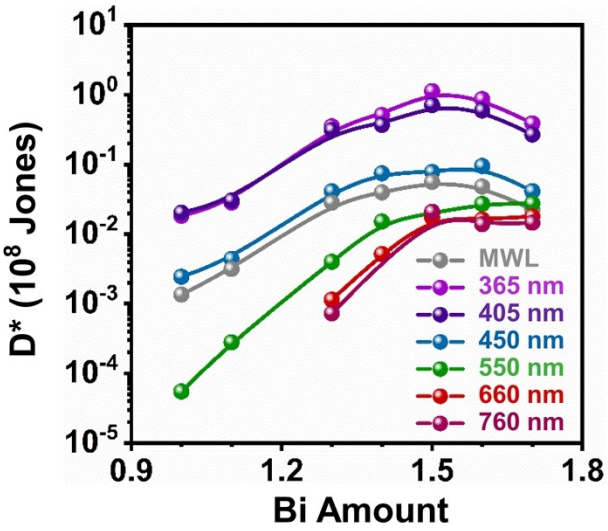

Fig. S6 Bi:Nb ratio-dependent specific detectivity D^* of ITO/BBNO/Ag devices under different wavelengths.

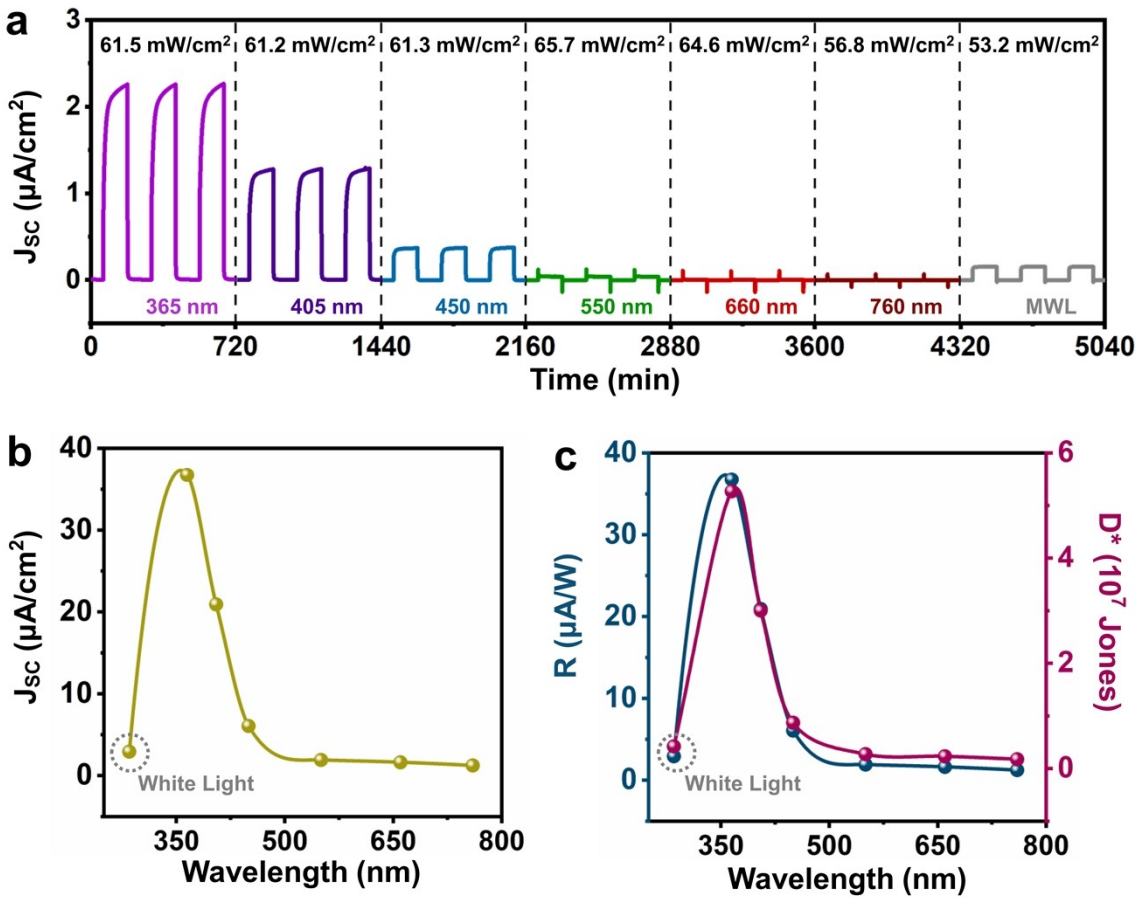

Fig. S7 Wavelength-dependent photoresponse of $Ba_2Bi_{1.5}Nb_{0.5}O_6$ to different wavelengths of light. (a) J_{sc}-t curves under 365-760 nm and white light. (b) Wavelength-dependent photocurrent density J_{sc}, responsivity R, and specific detectivity D^*.

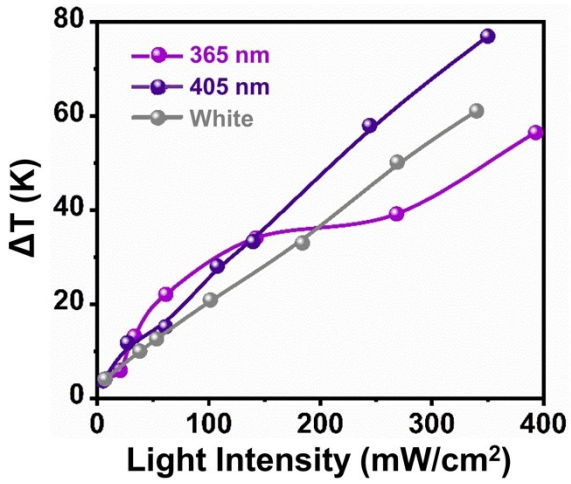

Fig. S8 Surface temperature change as illuminated by different intensities of 365, 405 nm, and white light.

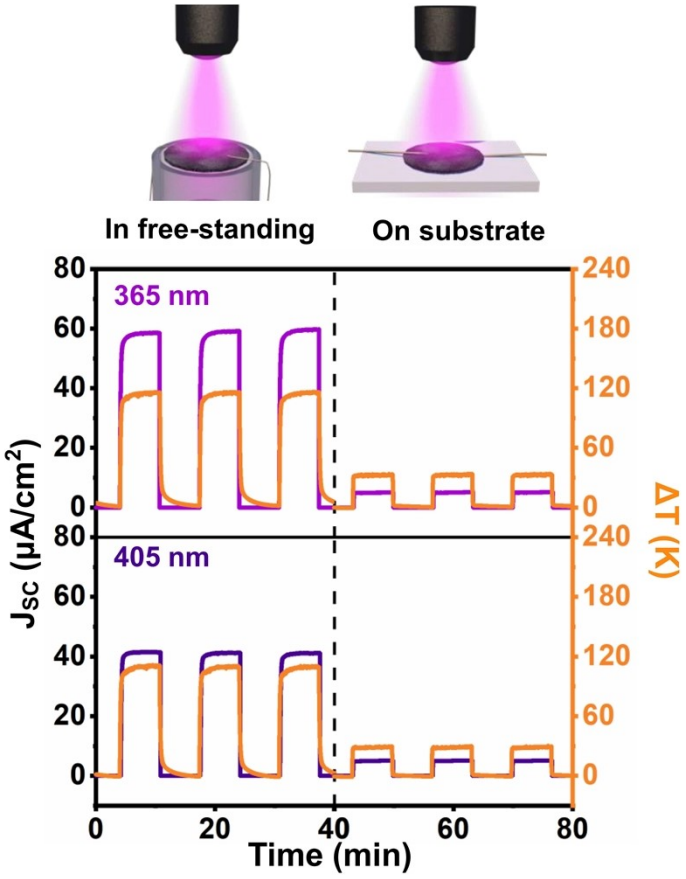

Fig. S9 Photocurrent and surface temperature rise under 365 and 405 nm illumination when the ITO/BBNO/Ag photodetector in free-standing and on substrate state.

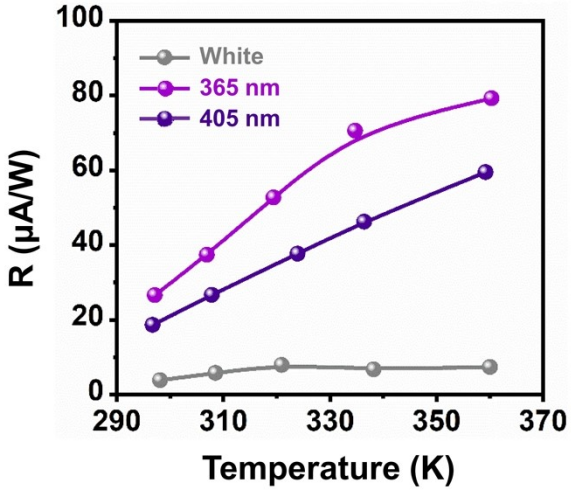

Fig. S10 Temperature-dependent responsivity to white, 365, and 405 nm light.

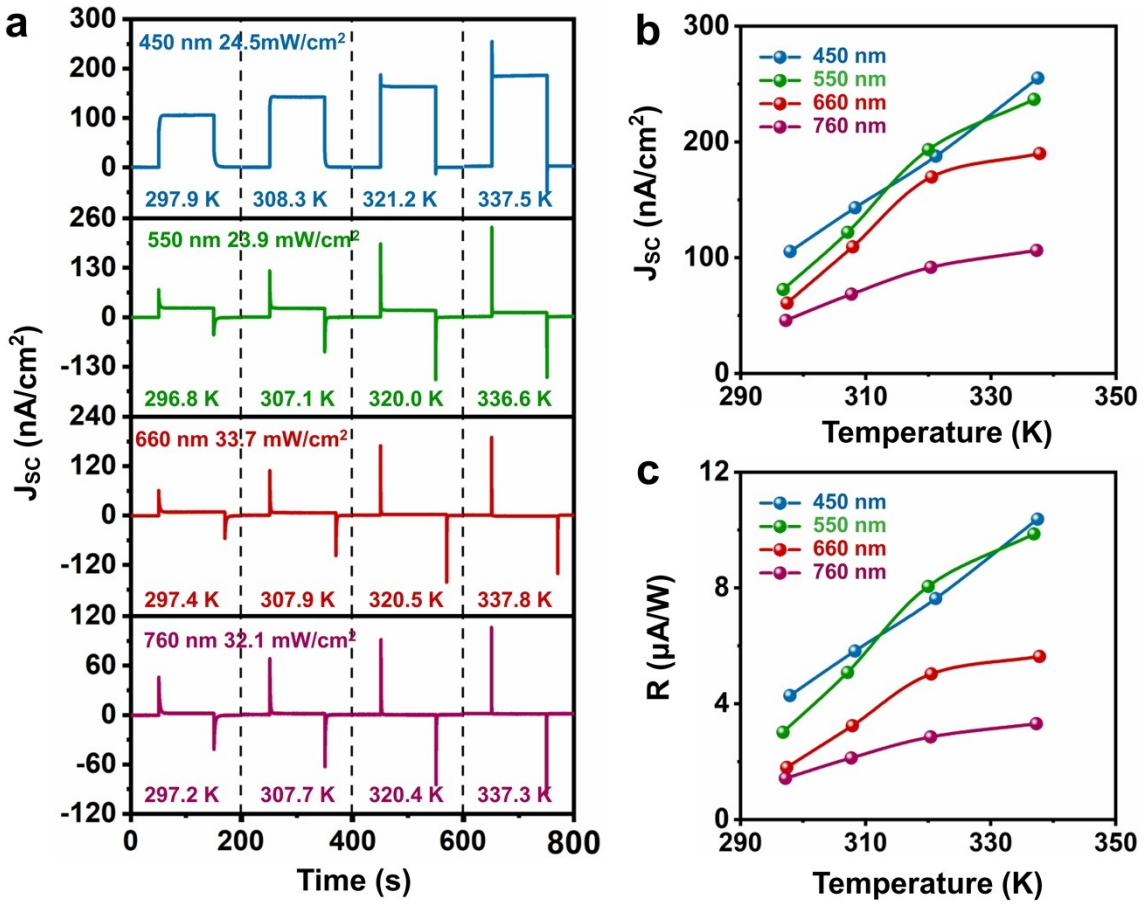

Fig. S11 Temperature-dependent photoresponse to 450, 550, 660 and 760 nm light. (a) J_{sc}-t curves at different temperatures. (b,c) Peak photocurrent density J_{sc} and responsivity R change with temperature.

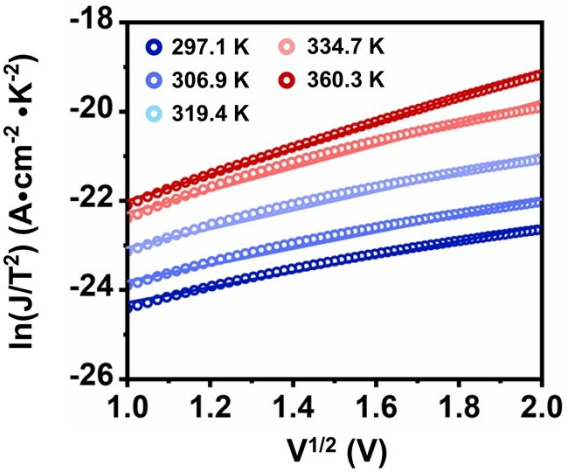

Fig. S12 *ln(J/T²)* versus $V^{0.5}$ curves under positive bias voltage.

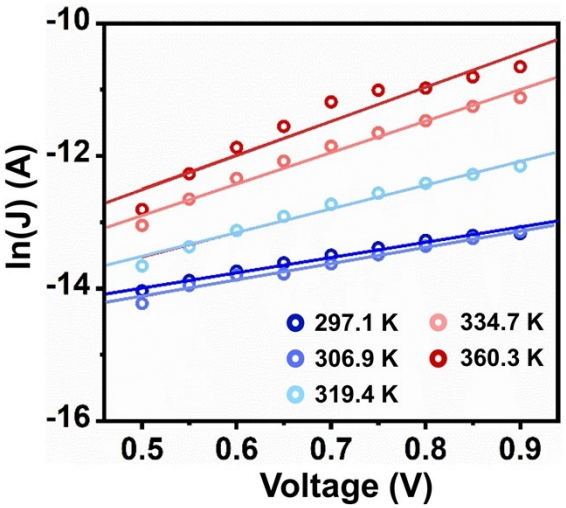

Fig. S13 *ln(J)* versus *V* under positive bias voltage.

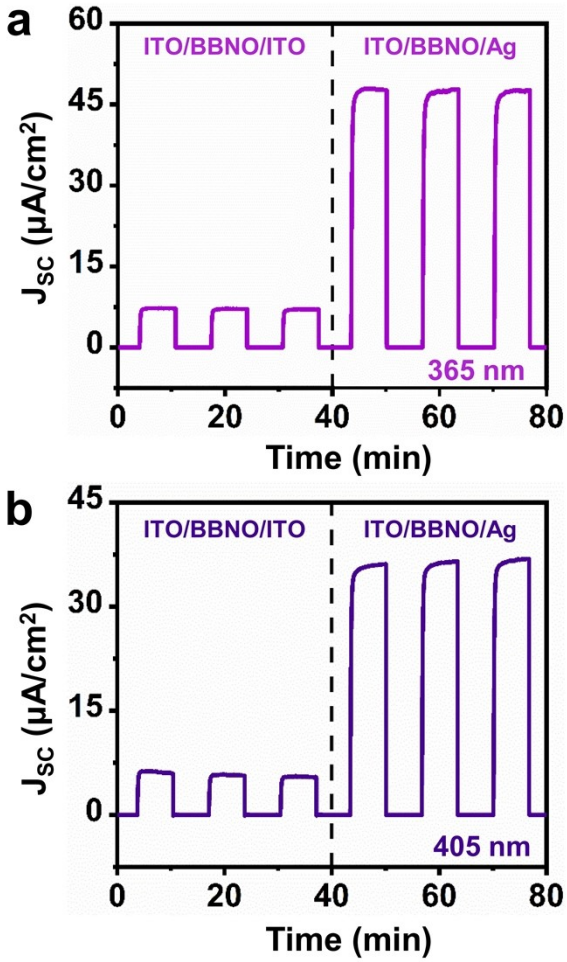

Fig. S14 Effect of bottom electrode on the photocurrent for BBNO-based photodetectors under 365 nm (661 mW/cm^2) and 405 nm (742 mW/cm^2) light.

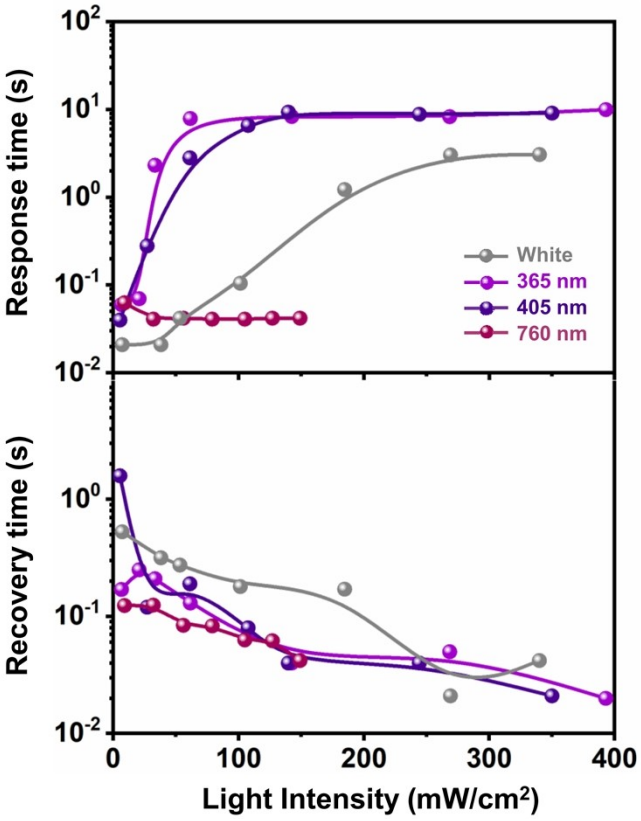

Figure. S15 Response and recovery time change with the increasing intensity of white, 365, 405, and 760 nm light.

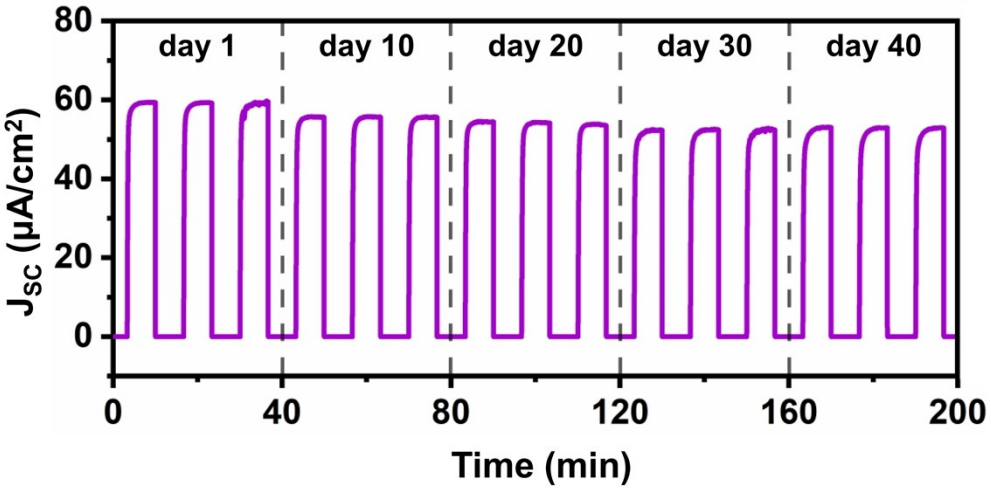

Fig. S16 Long-time stability of ITO/BBNO/Ag photodetector under 365 nm light (661 mW/cm^2).

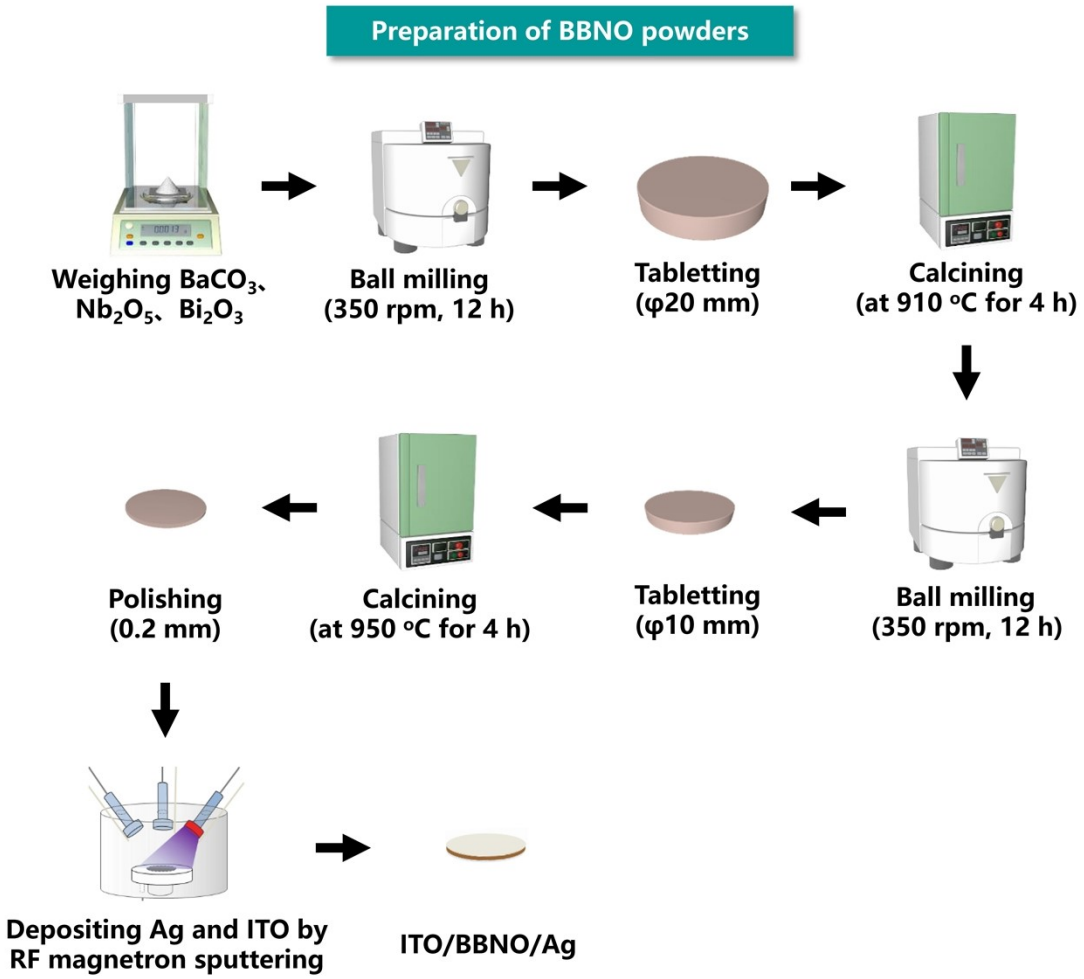

Fig. S17 Schematic illustration for the fabrication process of ITO/BBNO/Ag photodetectors.

Table S1. Comparison of the Photodetection Parameters for ITO/BBNO/Ag Photodetector and Other Types of Self-powered Photodetectors.

Photodetector	Wavelength (nm)	Intensity (mW/cm^2)	Responsivity (A/W)	Specific detectivity (Jones)
[1]**ITO/$BaTiO_3$/Ag**	405	111.1	3.25×10^{-7}	2.97×10^{5}
[2]**Pt/$TmFeO_3$/Pt**	405	2.56	1.1×10^{-5}	/
[3]**ITO/$Bi_{0.5}Na_{0.5}TiO_3$/Ag**	405	155.05	4.06×10^{-6}	1.27×10^{7}
[4]**ITO/PLZTN9/Ag**	AM 1.5G	100	3.67×10^{-7}	9.08×10^{7}
	NIR	55.87	2.78×10^{-7}	6.86×10^{7}
[5]**Au/BZT-BCT0.985/Au**	405	100	8.48×10^{-7}	2.37×10^{6}
	520	100	3.25×10^{-7}	9.09×10^{5}
	655	100	1.79×10^{-7}	5.01×10^{5}
	Xeno lamp	100	1.79×10^{-7}	5.00×10^{5}
ITO/BBNO/Ag	365	661	7.88×10^{-5}	1.13×10^{8}
(This work)	405	742	4.96×10^{-5}	7.11×10^{8}
	760	105.6	1.46×10^{-6}	2.1×10^{6}
	white	340.0	3.91×10^{-6}	5.61×10^{6}

References for Supporting Information

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