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Supporting information

Ultrasensitive UV-NIR Broadband Phototransistors Based on $AgBiS_2$-organic Hybrid Films

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Keywords: Phototransistors, $AgBiS_2$, silver bismuth sulfide, C8-BTBT

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Supporting figugres

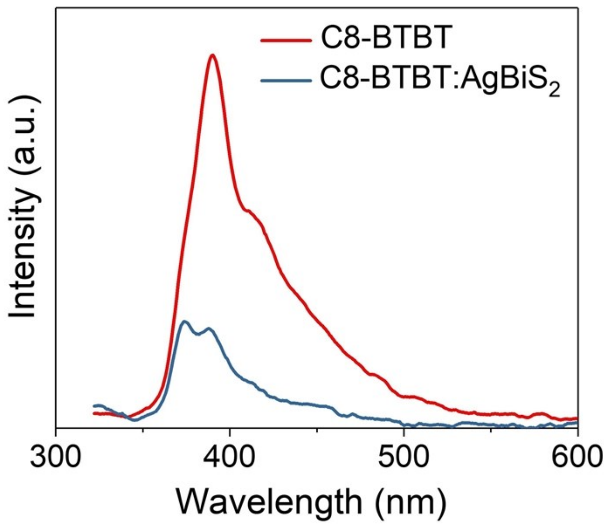
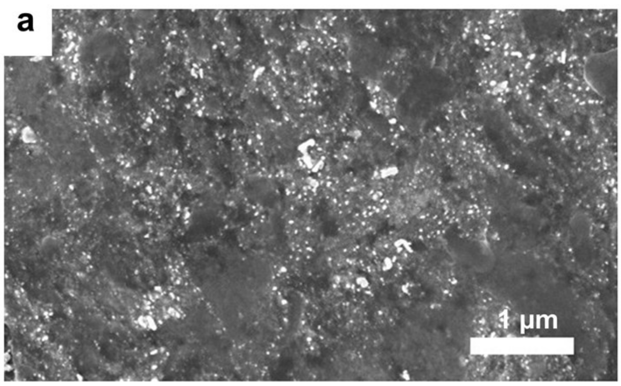


Fig. S1 Typical PL spectra of the pristine C8-BTBT and C8-BTBT:$AgBiS_2$ hybrid films.



b

C	O	Si
33.02%	49.8%	9.76%
Ag	**Bi**	**S**
0.1%	0.11%	0.26%

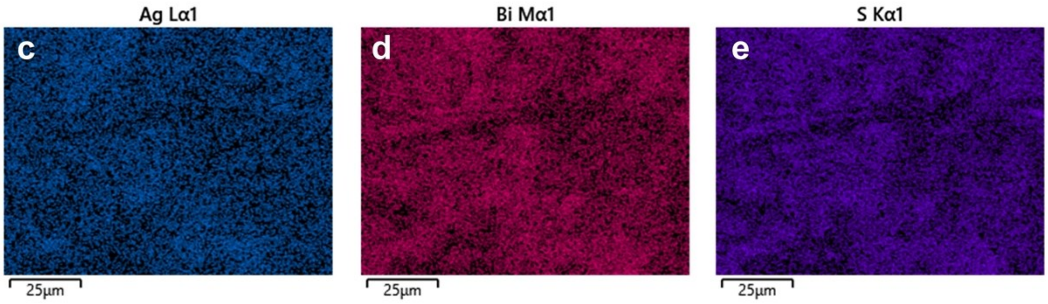


Fig. S2 (**a**) Typical SEM image of the hybrid films, (**b**) element statistics of the hybrid films on glass substrates and (**c**-**e**) EDX profiles of the SEM samples.

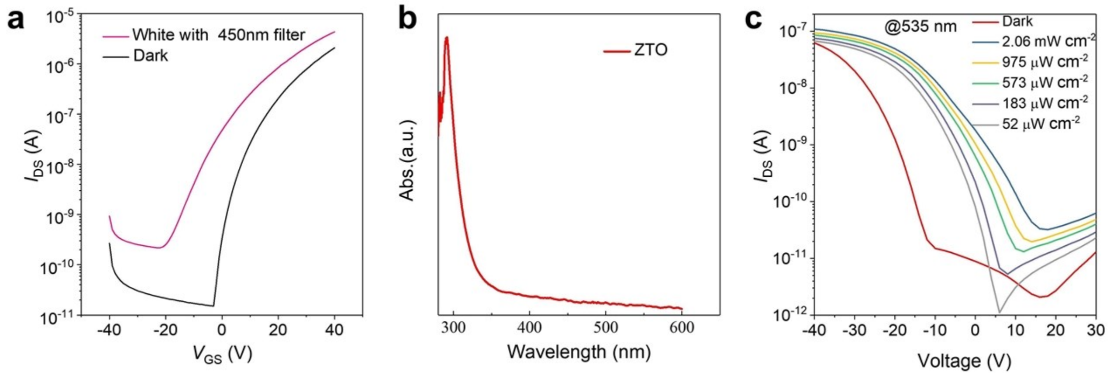


Fig. S3 (**a**) Transfer curves of ZTO based phototransistors in dark and under white light filtered with 450 nm long-pass filter, (**b**) typical absorption spectrum of ZTO films, (**c**) transfer curves of the $AgBiS_2$-organic hybrid phototransistors with SiO_2/Si substrates in dark and under illumination with various light intensity.

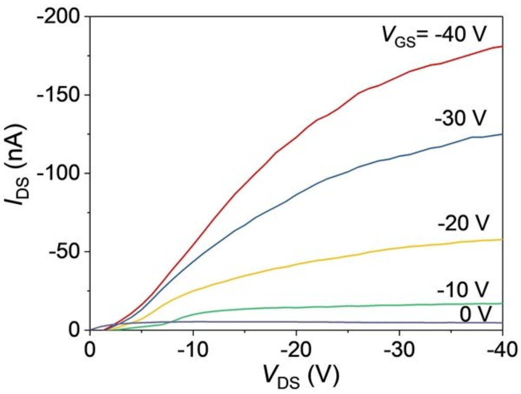


Fig. S4 Output curves of the optimized C8-BTBT:$AgBiS_2$ hybrid films based phototransistors in dark.

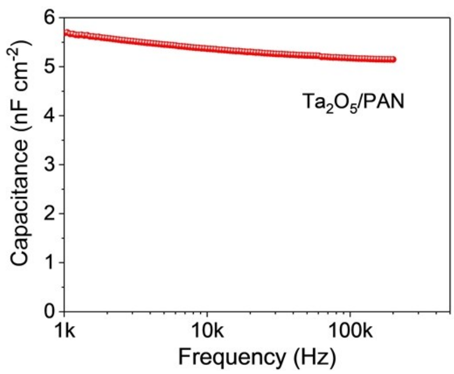


Fig. S5 The capacitance as a function of frequency of Ta_2O_5/PAN double dielectric layers.

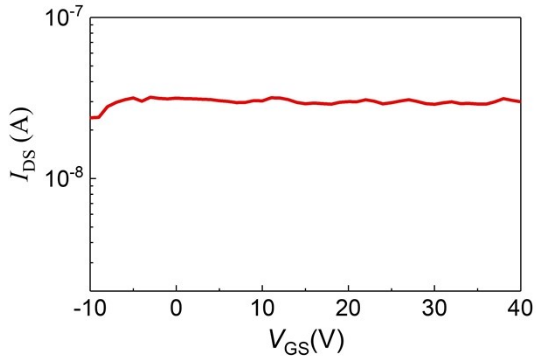


Fig. S6 Typical field-dependent I_{DS} of the devices based on pure $AgBiS_2$ QDs, indicating negligible field-effect transistor performance.

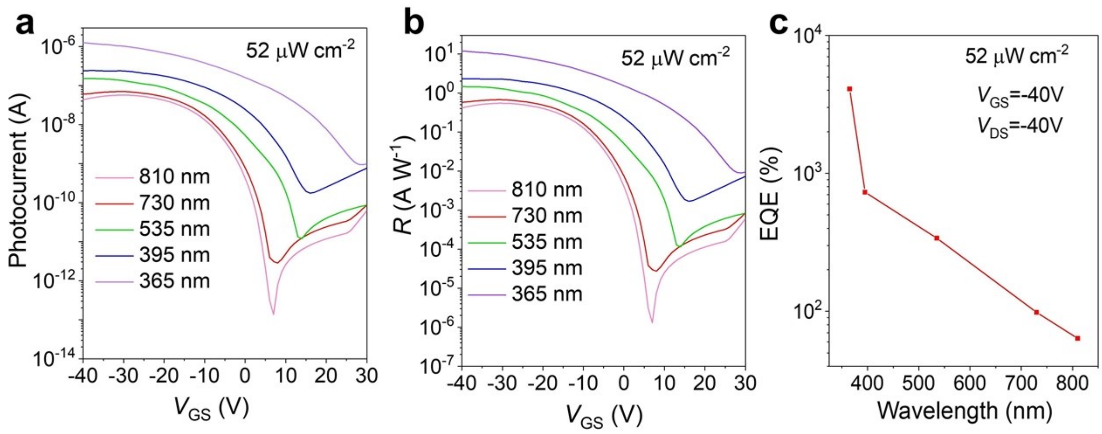


Fig. S7 (a) Photocurrent and **(b)** responsivity of the hybrid phototransistors illuminated with various wavelength photons as a function of gate voltage, and **(c)** calculated EQE versus wavelengths.

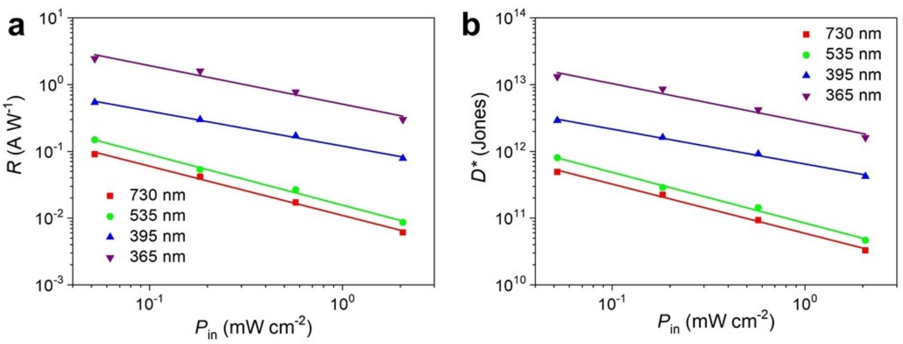


Fig. S8 (**a**) Responsivity and (**b**) specific detectivity as a function of light intensities under illumination with various wavelengths.

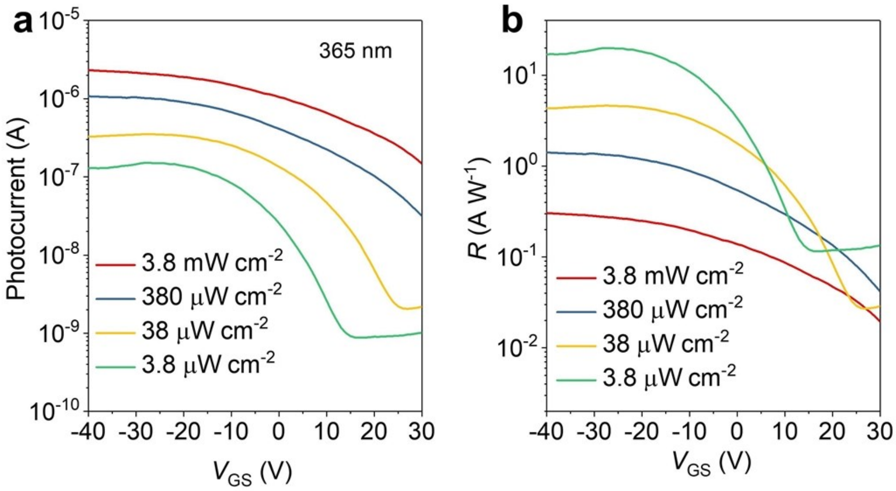


Fig. S9 (a) Photocurrent and **(b)** responsivity of the blend films based phototransistors under 365 nm LED with different light intensities.

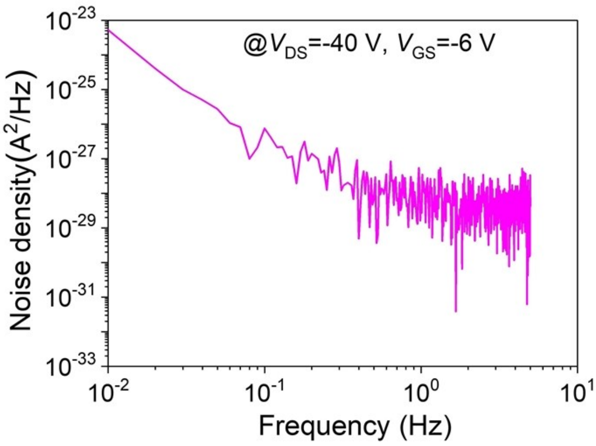


Fig. S10 Noise density of the blend films based phototransistors at V_{DS} = -40 V and V_{GS}= -6V.

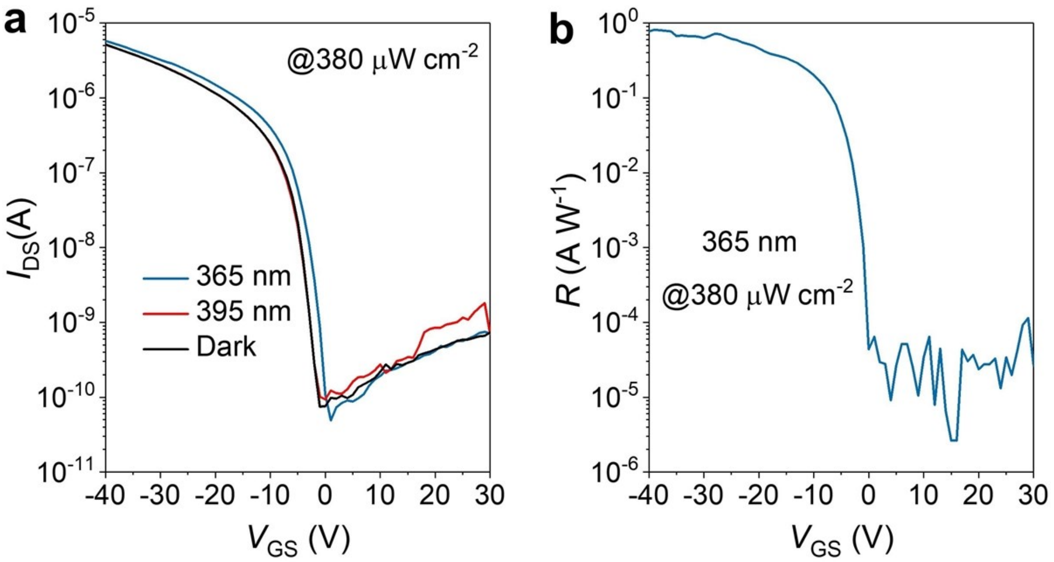


Fig. S11 (a) Transfer curves of C8-BTBT phototransistors in dark, and under 365 nm and 395 nm LEDs, respectively, **(b)** responsivity of C8-BTBT phototransistors under 365 nm LED as a function of gate voltage.