Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Improved performance of UV-blue dual-band Bi_2O_3/TiO_2 photodetector and application of visible light communication with UV light encryption

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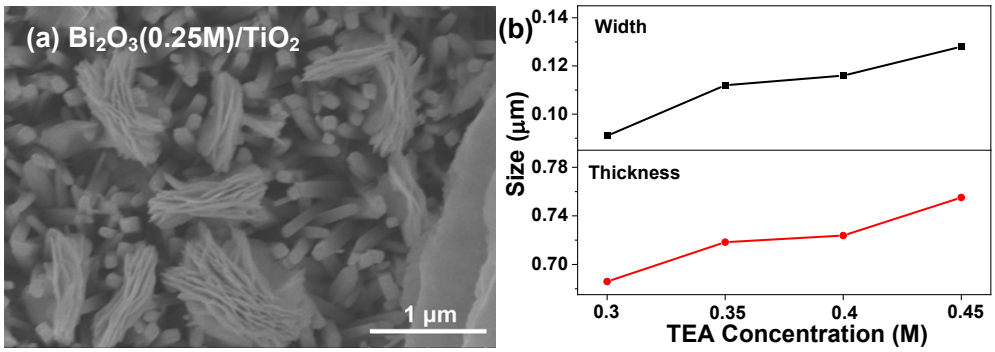

Fig.S1 (a) SEM image of Bi_2O_3(0.25M)/TiO_2 and (b) lateral dimension and thickness of individual Bi_2O_3/TiO_2 nanosheets with different TEA concentrations.

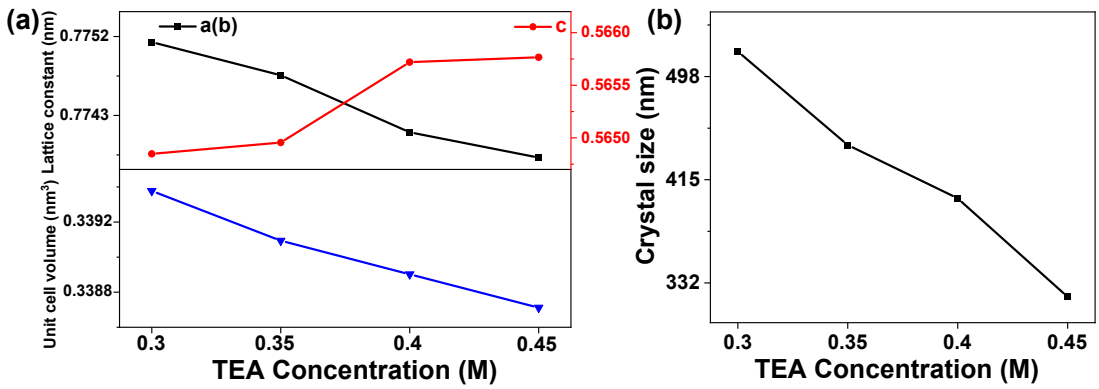

Fig.S2 (a) Lattice constants and crystal volume, and (b) crystal size of Bi_2O_3/TiO_2 with different TEA concentrations.

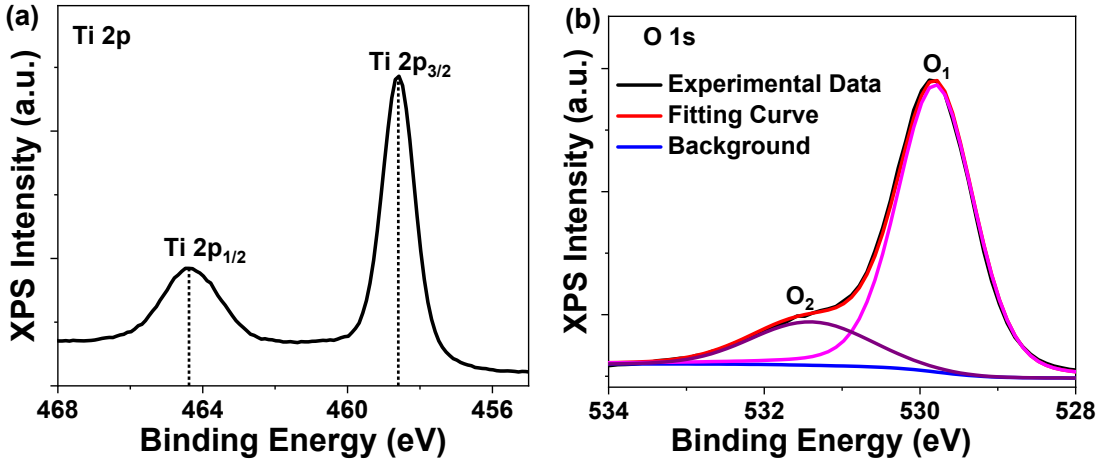

Fig.S3 (a) Ti 2p and (b) O 1s XPS spectra of TiO_2 NRs.

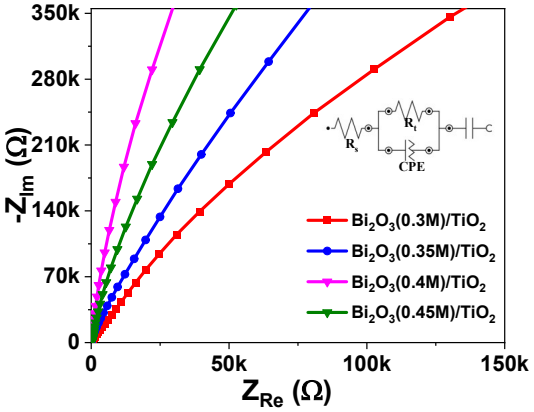

Fig.S4 EIS curves of Bi_2O_3/TiO_2 with different TEA concentrations.

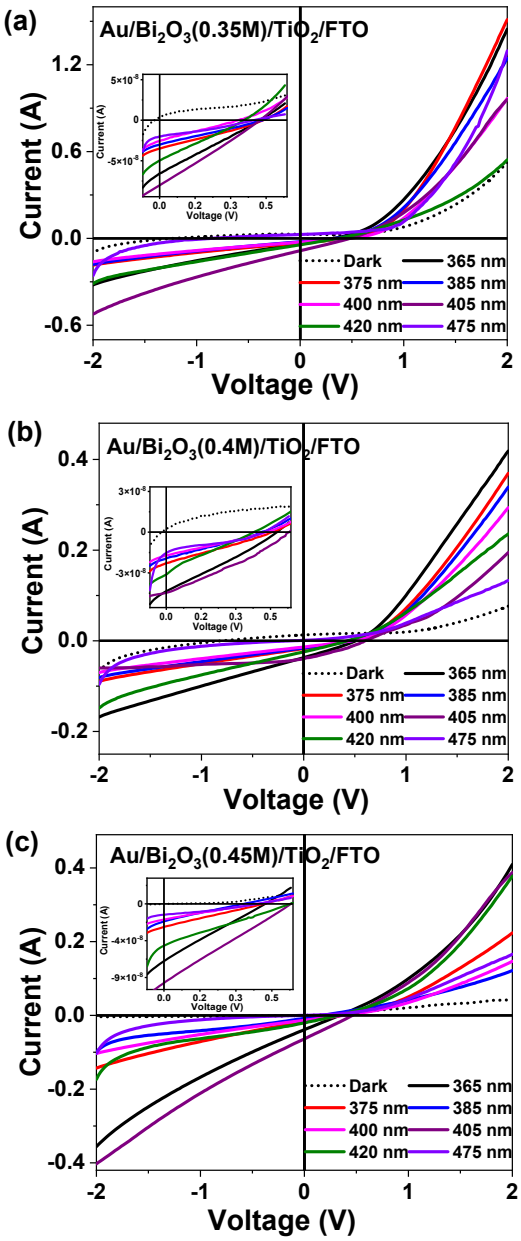

Fig.S5 I-V curves of (a) Bi_2O_3(0.35M)/TiO_2, (b) Bi_2O_3(0.4M)/TiO_2 and (c) Bi_2O_3(0.45M)/TiO_2 devices.

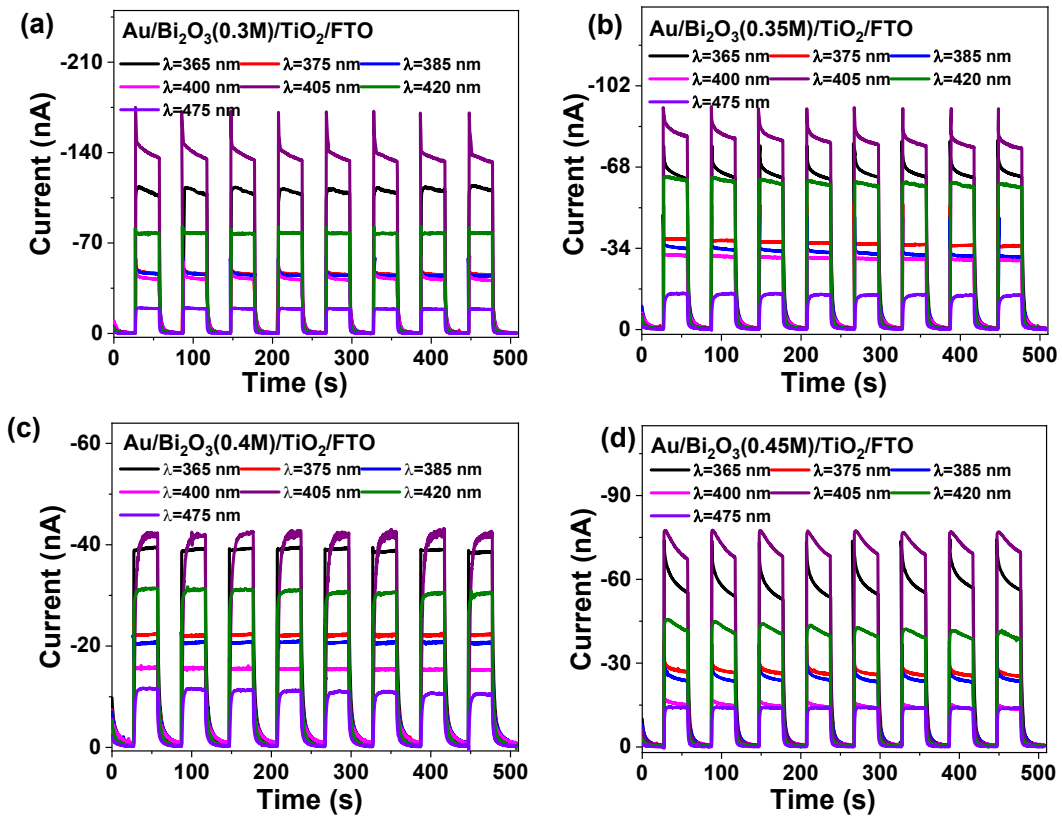

Fig.S6 I-t curves of (a) Bi_2O_3(0.3M)/TiO_2, (b) Bi_2O_3(0.35M)/TiO_2, (c) Bi_2O_3(0.4M)/TiO_2 and (d) Bi_2O_3(0.45M)/TiO_2 devices.

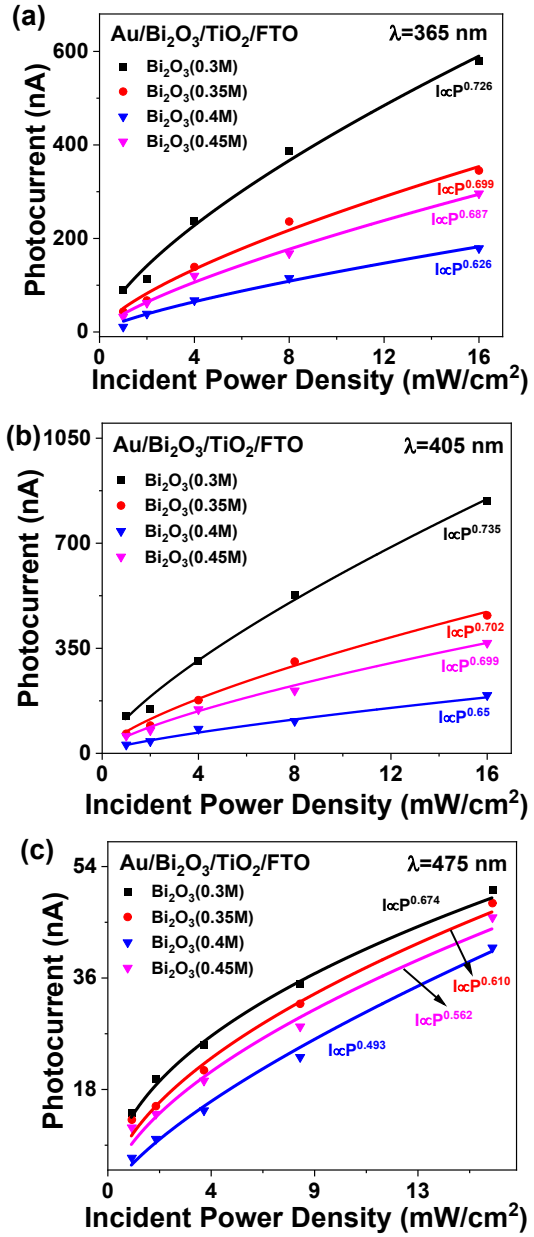

Fig.S7 I_{ph} of Au/Bi_2O_3/TiO_2/FTO devices under (a) 365 nm UV light, (b) 405 nm and (c) 475 nm illuminations with different incident powers.

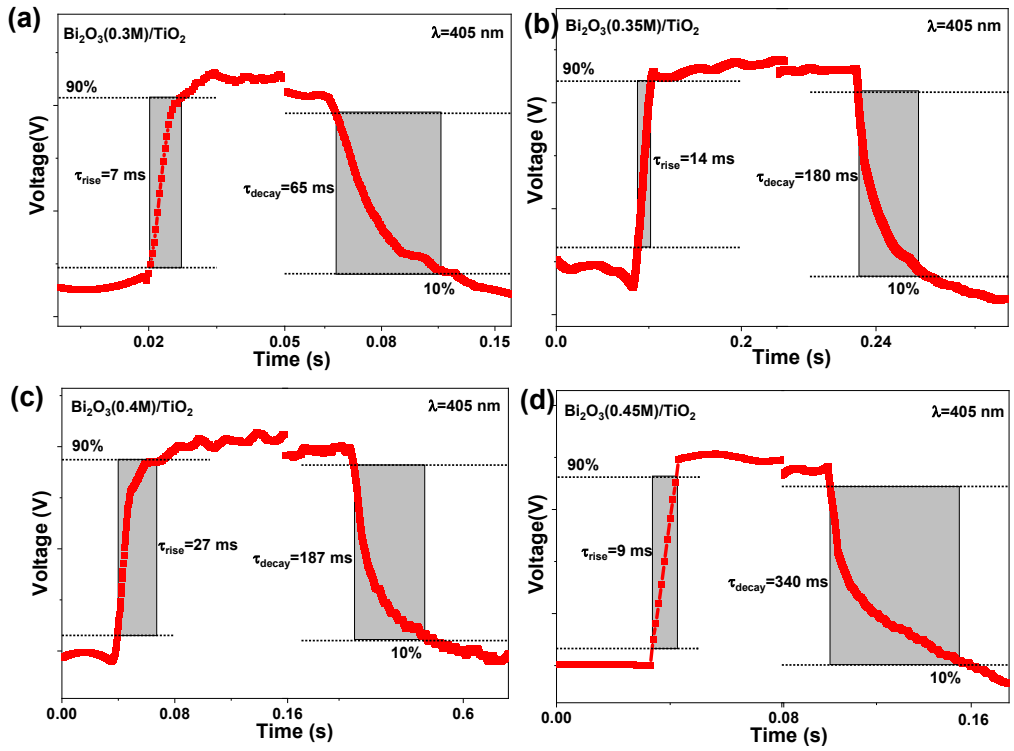

Fig.S8 τ_{rise} and τ_{decay} of (a) Bi_2O_3(0.3M)/TiO_2, (b) Bi_2O_3(0.35M)/TiO_2, (c) Bi_2O_3(0.4M)/TiO_2 and (d) Bi_2O_3(0.45M)/TiO_2 devices at 405 nm light illumination.

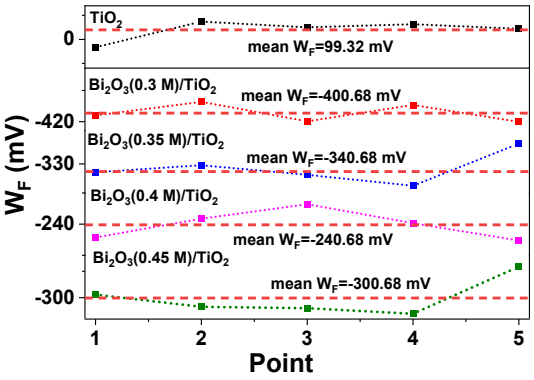

Fig.S9 Fermi energy level curves obtained from Kelvin probes of TiO_2 and Bi_2O_3/TiO_2 with different TEA concentrations.

Table.S1 TiO_2 and Bi_2O_3 films energy band structure related parameters

Samples	TiO_2	Bi_2O_3(0.3M)	Bi_2O_3(0.35M)	Bi_2O_3(0.4M)	Bi_2O_3(0.45M)
E_F (eV)	-4.46	-4.96	-4.90	-4.80	-4.86
E_g (eV)	3.00	2.42	2.42	2.42	2.42
E_c (eV)	-4.06	-3.36	-3.30	-3.20	-3.26
E_v (eV)	-7.06	-5.73	-5.67	-5.57	-5.63

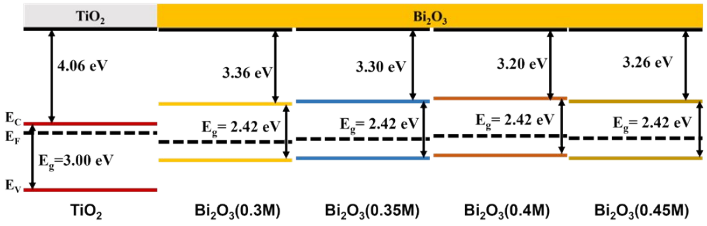

Fig.S10 Band diagrams before contact of Bi_2O_3/TiO_2 heterojunctions.