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Electronic Supplementary Information (ESI)

Self-powered UV-Visible Photodetector with Fast Response and High Photosensitivity Employing Fe:TiO_2/n-Si Heterojunction

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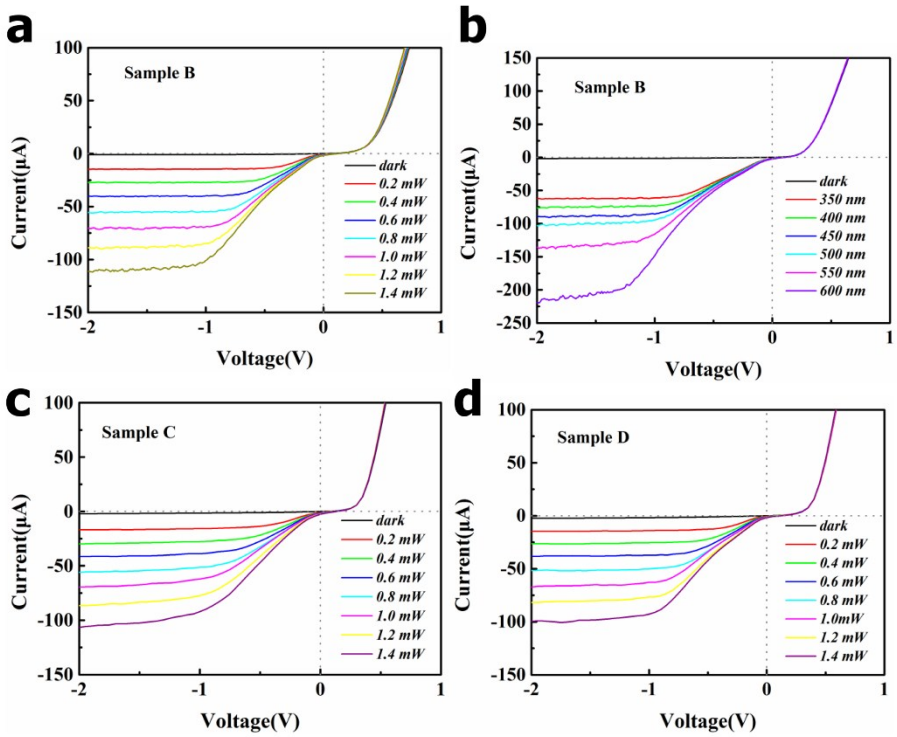

Fig. S1 Photoresponse of Sample B, C and D with the device area = 0.25 cm^2. (a, c, d) *I-V*

characteristics of the heterojunction photodetector under various incident light power. (b) Photocurrent characteristics of Sample B with the wavelength of the incident radiation from 350 to 600 nm at a constant intensity of 0.5 mW·cm^{-2}.

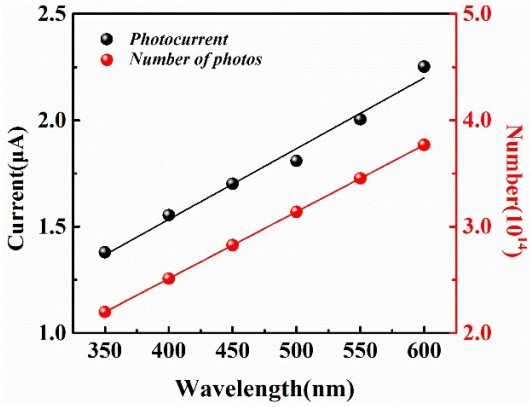

Fig. S2 Photocurrent and number of photons of the device for different wavelength of light and the linear correlation coefficient (R^2) of curve is 0.99. The number of photons with different wavelength was obtained according to the formula $P{\cdot}S = N{\cdot}h{\cdot}c/\lambda$, where the P, S, N, h, c, λ are the light power density, the effective area under irradiation, the number of incident photons, Planck's constant, the velocity of light, and the wavelength of illuminated light, respectively.[1]

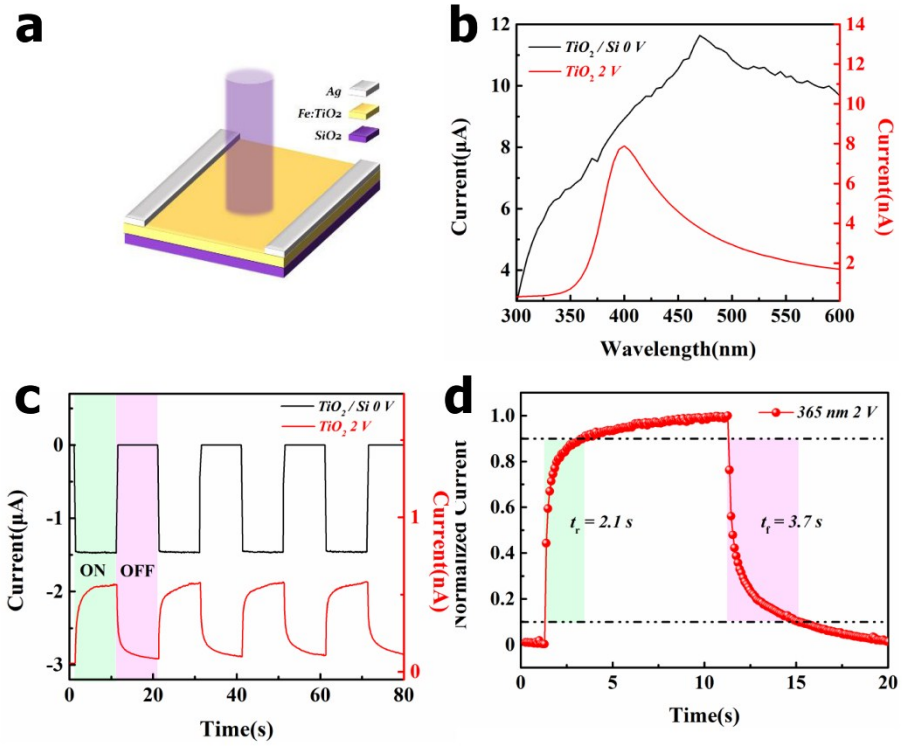

Fig. S3 Comparison of photoresponse of TiO_2/Si heterojunction device and TiO_2 thin film device. (a) Spectral response of TiO_2/Si heterojunction device and TiO_2 thin film device (The inset is Schematic diagram of TiO_2 thin film device). (b) Photocurrent switching behaviors obtained from TiO_2/Si heterojunction device and TiO_2 thin film device with the wavelength of

365 nm at a intensity of 1.0 mW·cm^{-2}. (c) One cycle of photoswitching photocurrent for TiO_2 thin film device at 2 V bias with a light of 365 nm.

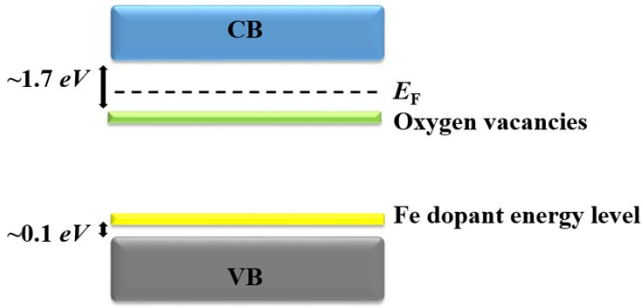

Fig. S4 Schematic diagram of the electronic band structure for the anatase Fe-doped TiO_2[2,3]

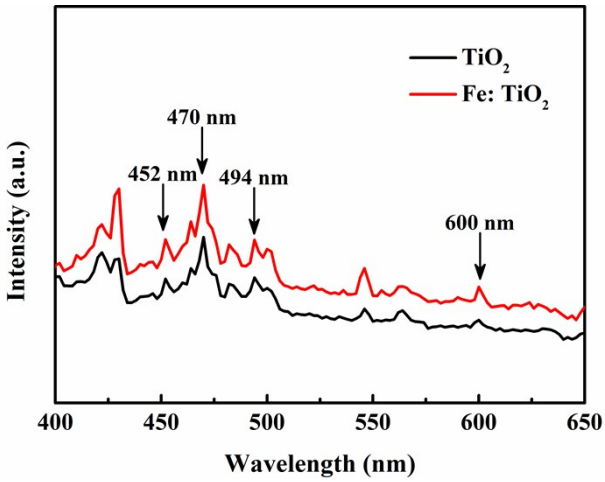

Fig. S5 Photoluminescence spectra of pure TiO_2 film and Fe-doped TiO_2 film.

References

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