Supplementary Information

Fe doped ZnO/$BiVO_4$ heterostructure based large area, flexible, high performance broadband photodetector with ultrahigh quantum yield

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S1. Device's cross-sectional studies.

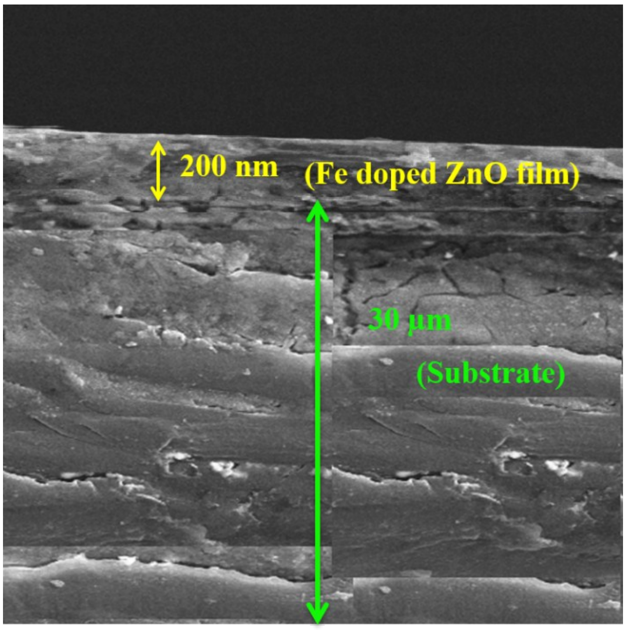

Fig. S1. Cross-sectional FESEM image of the hybrid device.

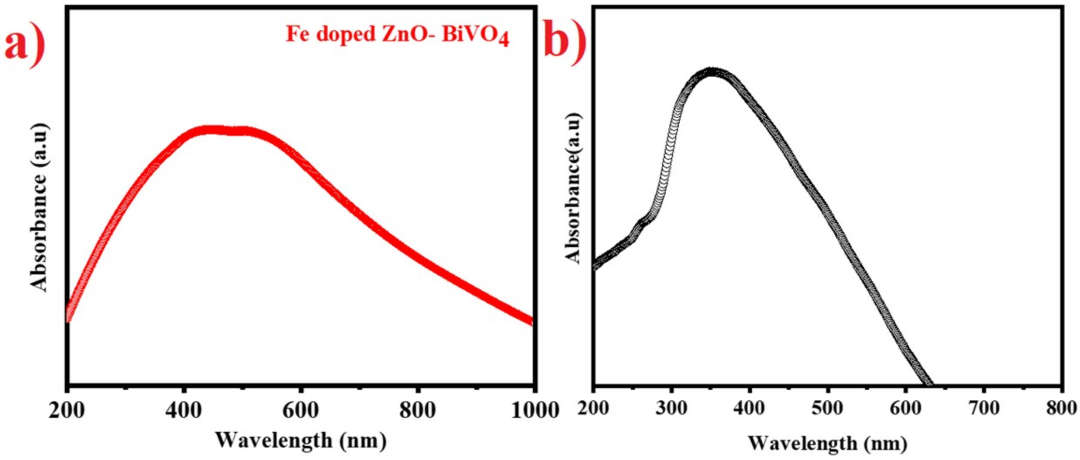

Figure S2 UV-VIS absorbance spectroscopy of a) Fe-ZnO- $BiVO_4$ and b) ZnO.

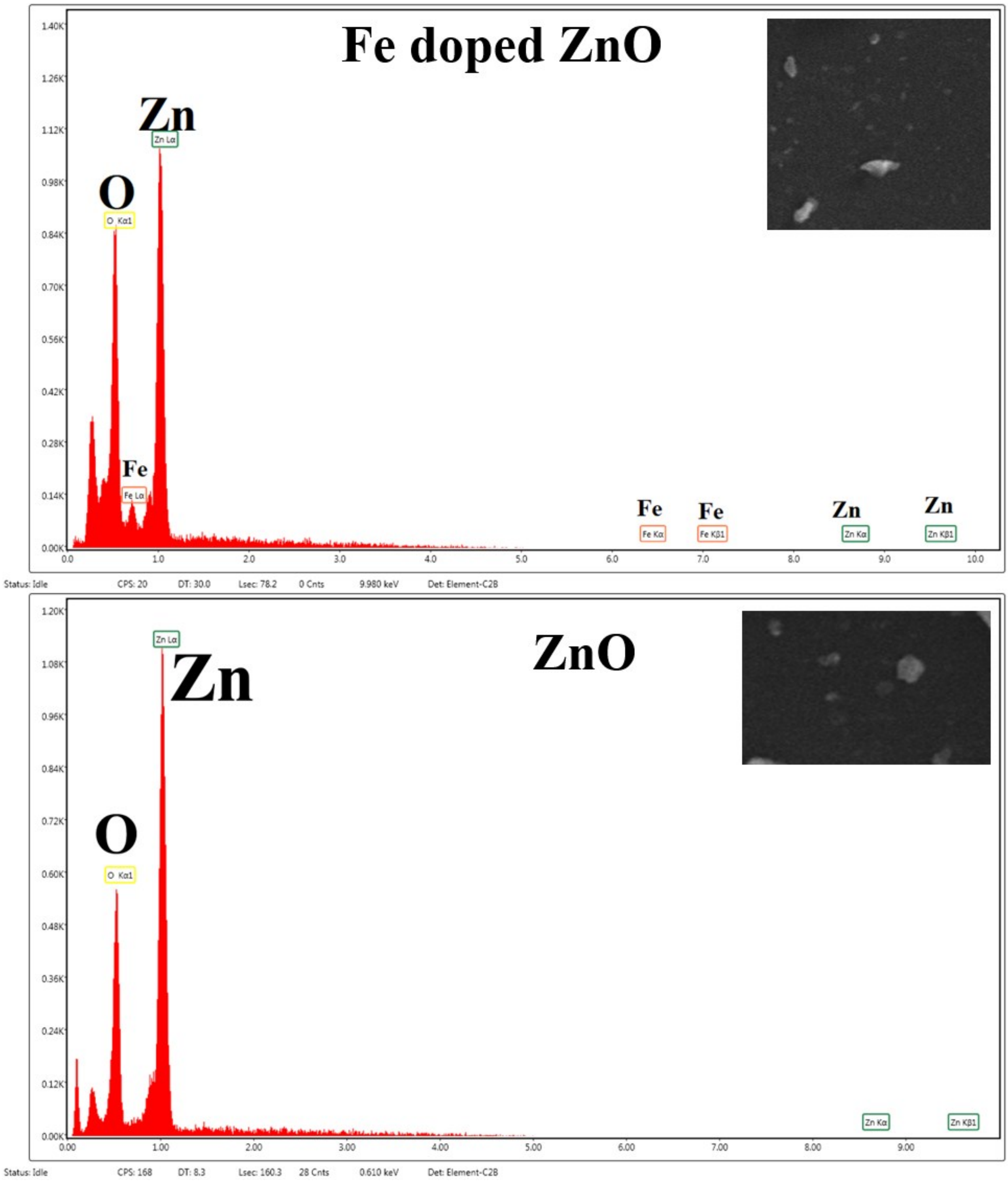

Figure S3. EDAX based elemental composition for a) Fe doped ZnO and b) ZnO thin films.

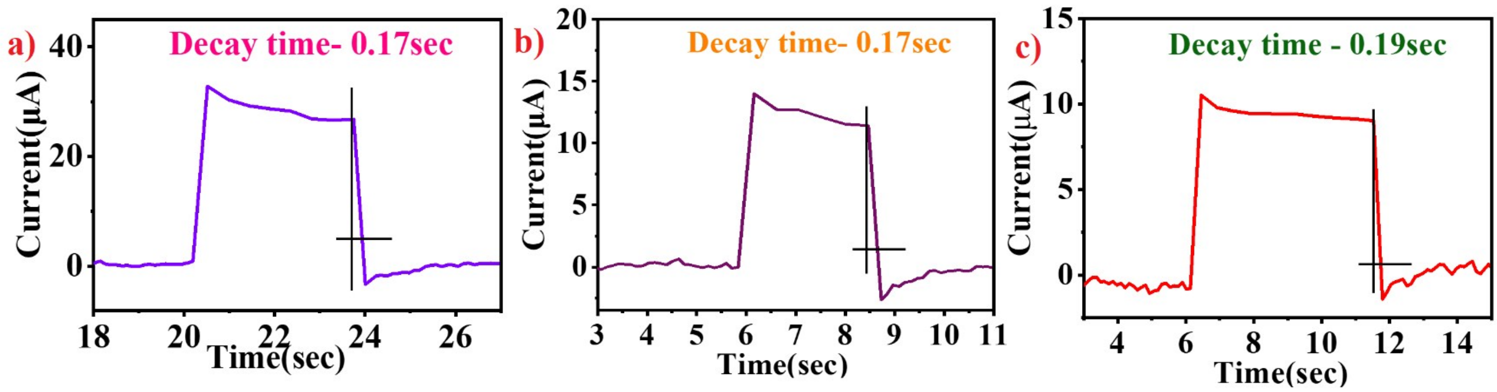

Figure S4. Decay-time response of the device for (a) UV (b) visible and (c) NIR illuminations.

S2. Electrical Characterisation of pristine $BiVO_4$, Fe doped ZnO and ZnO.

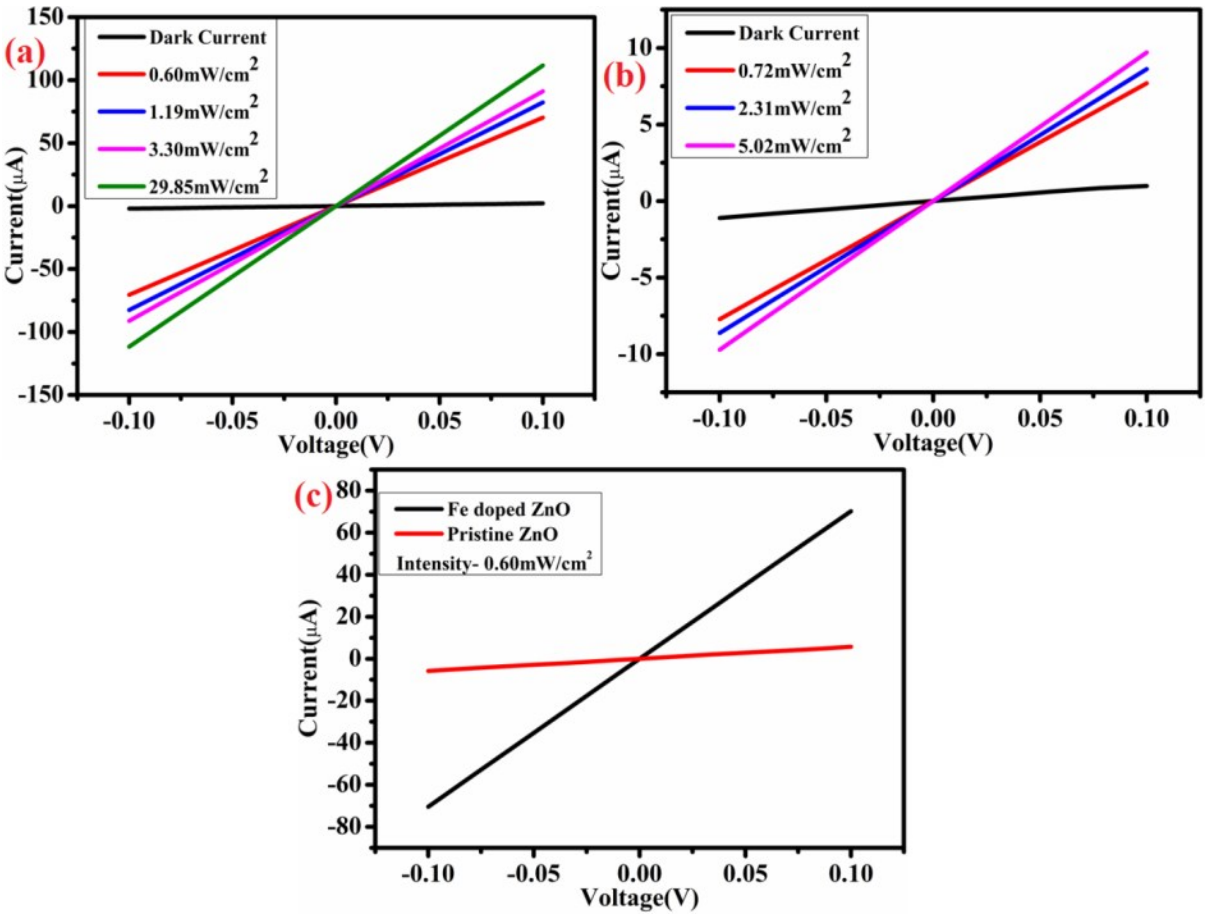

Fig. S5. Control sample studies indicating Current vs Voltage studies of (a) Fe doped ZnO films (b) $BiVO_4$ nanofibers (c) Comparative I-V studies of Fe doped ZnO and pristine ZnO

S3. Interface studies of Fe doped ZnO film vs. substrate and built-in potential studies.

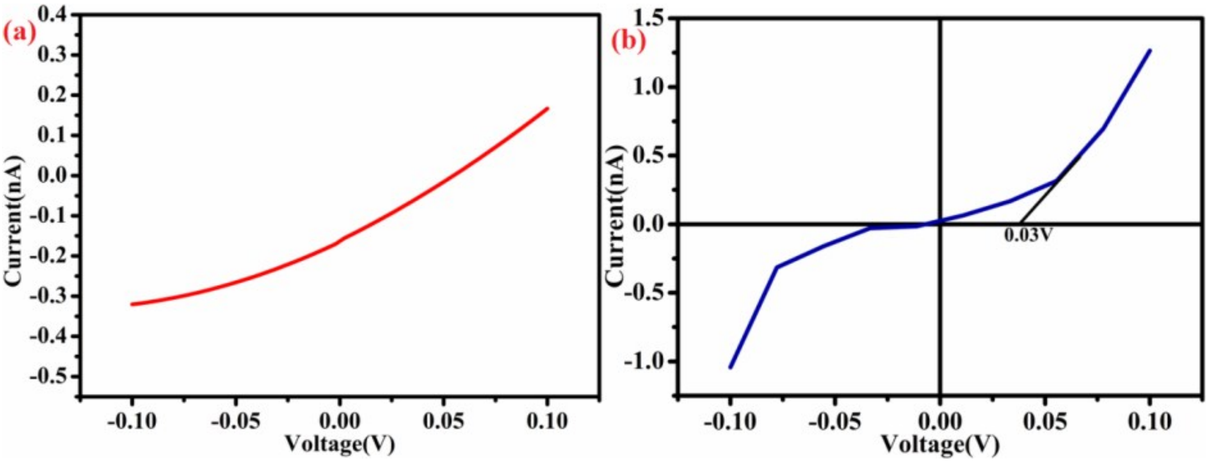

Fig. S6. (a) I-V response of Fe doped ZnO and ITO junction. (b) graph displaying the built-in potential for FZO-BVO junction.

S4. Formula used to calculate electron affinity of Fe doped ZnO

$$\Phi_B = \Phi_m - ▯_s$$

Where Φ_B is the built-in potential at the interface of materials, Φ_m is the work function of ITO and $▯_s$ is the electron affinity of the Fe doped ZnO. The as calculated value of electron affinity is 4.66eV.

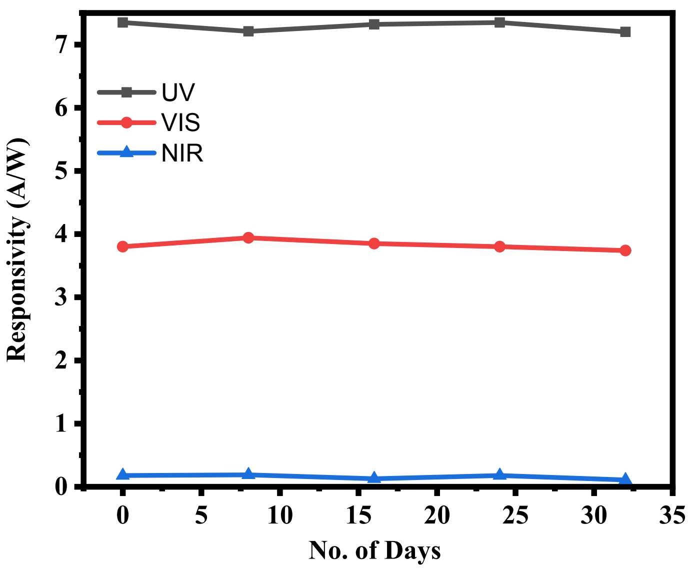

Fig. S7 Responsivity of the device w.r.t. number of days towards all three wavelengths

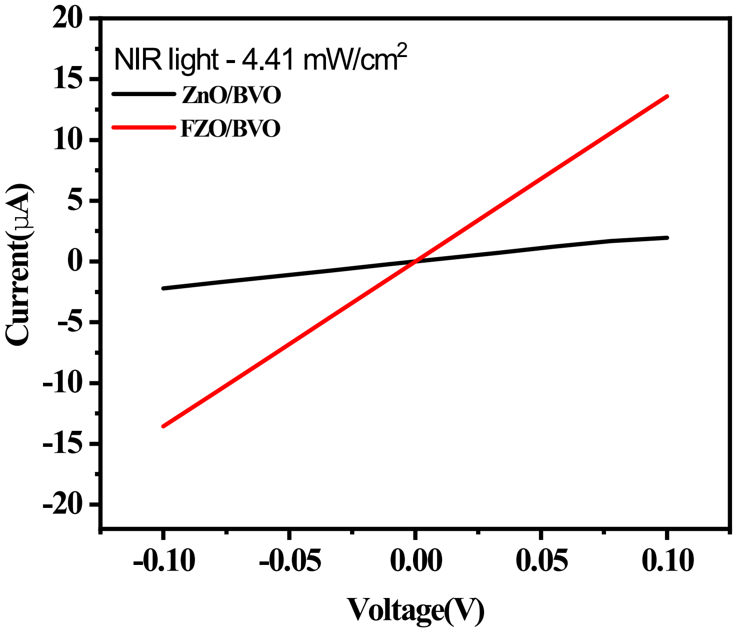

Figure S8. Control sample studies indicating Current vs Voltage studies of Fe doped ZnO/ $BiVO_4$ and ZnO/$BiVO_4$ thin films.

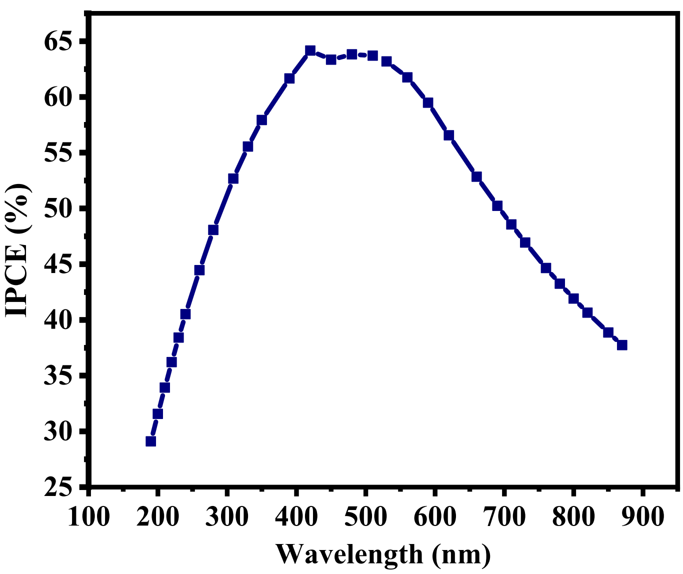

Figure S9. The IPCE spectrum for the FZO/BVO device