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

Supplementary Information for

Tuning the spectral response of ultraviolet organic-inorganic hybrid photodetectors via charge trapping and charge collection narrowing

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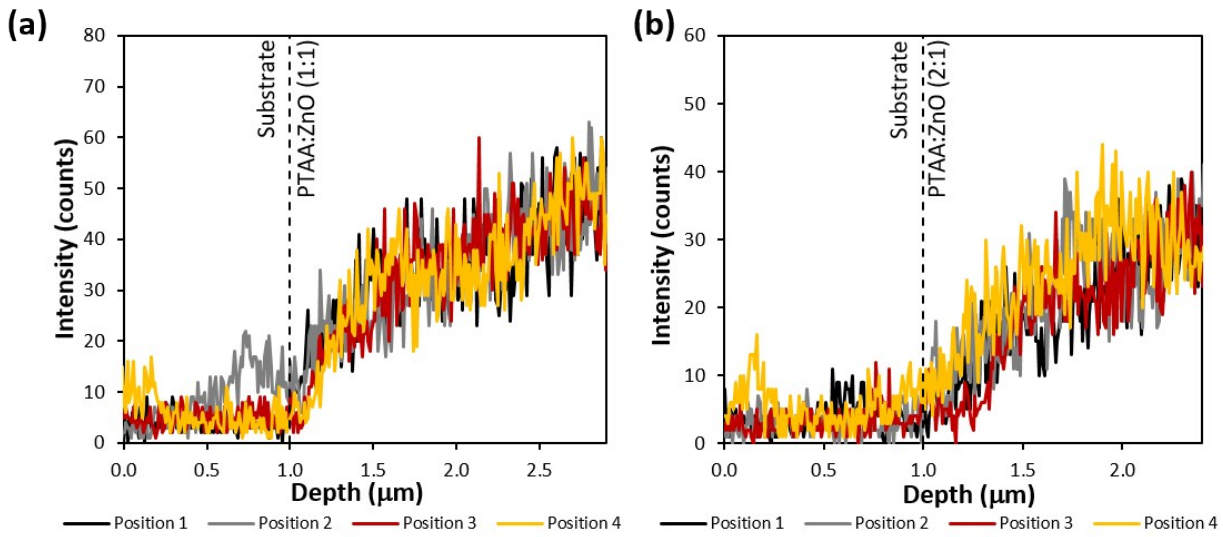

Fig. S1. The distribution of ZnO in the thick blended films corresponding to the active layers of (a) Device 1900-1:1 and (b) Device 1400-2:1, obtained via EDS. The four plotted curves were the result of vertical scans done in four positions across the films.

As demonstrated in Fig. S1, the ZnO nanoparticles are not evenly distributed throughout the blended active layer films, but are more concentrated towards the top of the films. This trend is more apparent for the films with the 1:1 PTAA:ZnO weight ratio, which may be due to both the increased film thickness and the increased ZnO content.

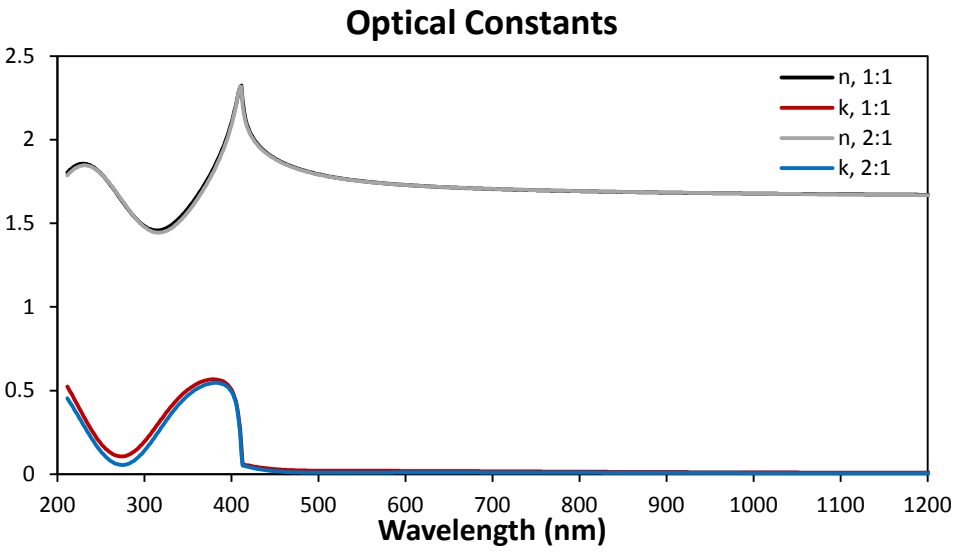

Fig. S2. The optical constants of refractive index, n, and extinction coefficient, k, for the blends of PTAA and ZnO with weight ratios of 1:1 and 2:1, as obtained via spectroscopic ellipsometry.

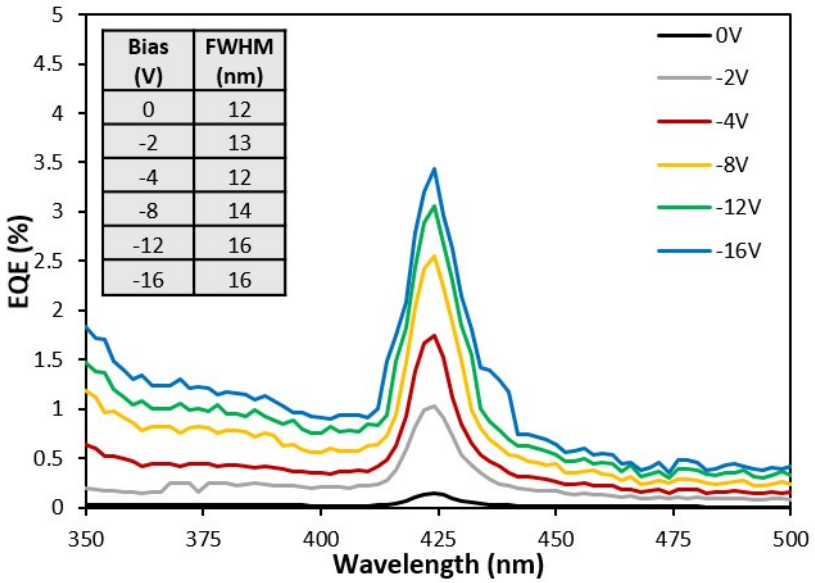

Fig. S3. EQE spectra for Device 1900-1:1 tested under strong reverse biases, demonstrating the stable shape of the curve and the stability of the FWHM values. Inset: Table of the FWHM values for each subsequent scan.

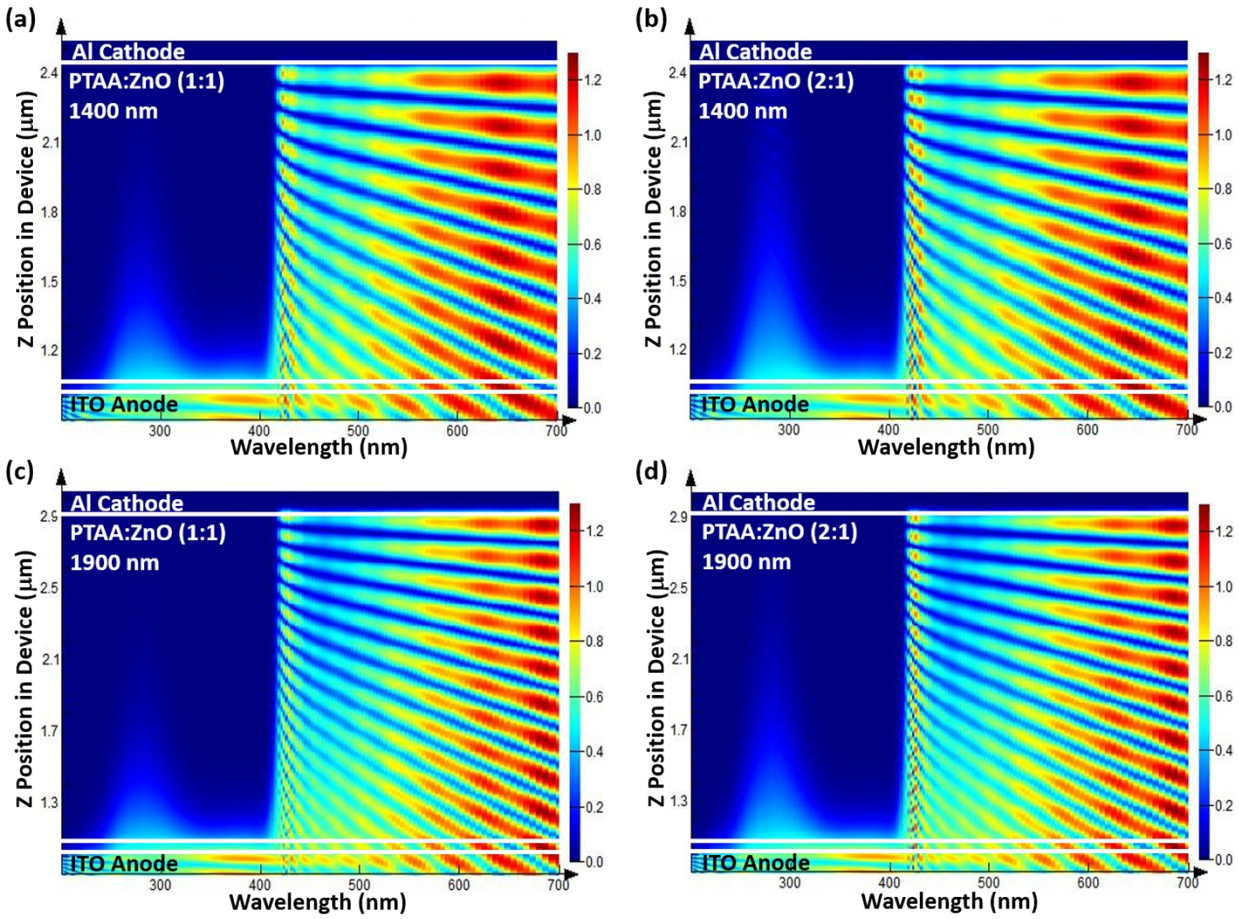

Fig. S4. Electric field distribution obtained via 3D-FDTD simulations for devices with (a) a PTAA:ZnO weight ratio of 1:1 and active layer thickness of 1400 nm, (b) a PTAA:ZnO weight ratio of 2:1 and active layer thickness of 1400 nm, (c) a PTAA:ZnO weight ratio of 1:1 and active layer thickness of 1900 nm, and (d) a PTAA:ZnO weight ratio of 2:1 and active layer thickness of 1900 nm.

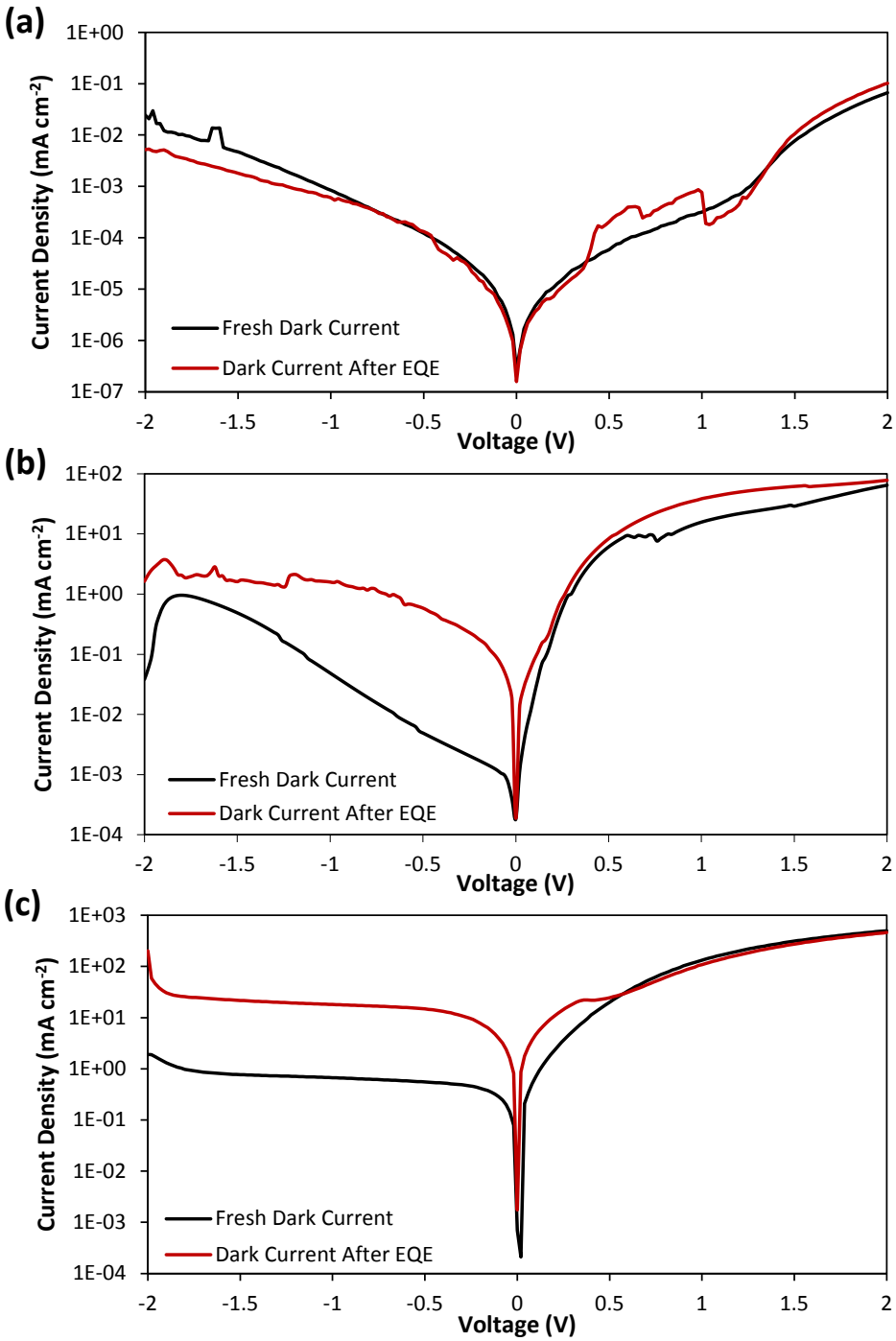

Fig. S5. Current density-voltage characteristics for (a) a pure PTAA device (ITO/PEDOT:PSS/PTAA/BCP/Al) with a 200 nm active layer, (b) a pure ZnO device (ITO/PEDOT:PSS/ZnO/BCP/Al) with a 260 nm active layer, and (c) a device with a PTAA:ZnO weight ratio of 1:10 and a 150 nm active layer.

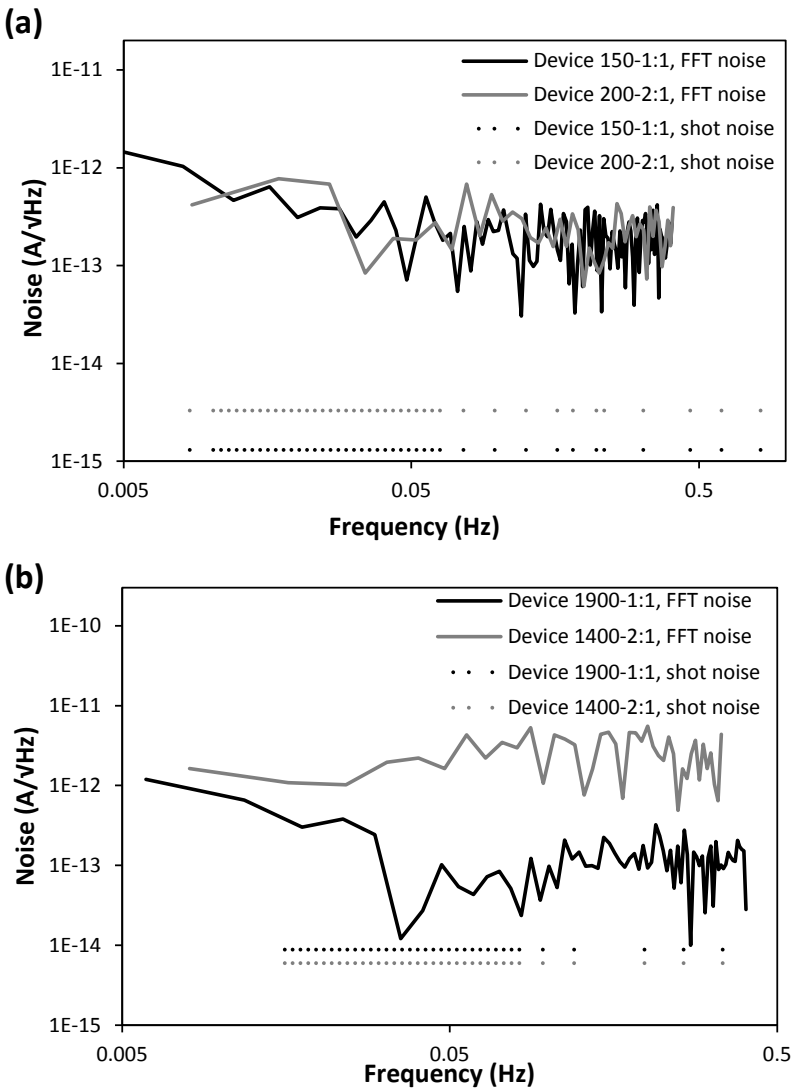

Fig. S6. Noise currents under no bias obtained from FFT and calculated shot noise approximations for (a) Devices 150-1:1 and 200-2:1, and (b) Devices 1900-1:1 and 1400-2:1.