Electronic Supplementary Material (ESI) for RSC Advances.

SUPPORTING INFORMATION

Self-powered photodetector through facile processing using polyethyleneimine/carbon quantum dots for highly sensitive UVC detection

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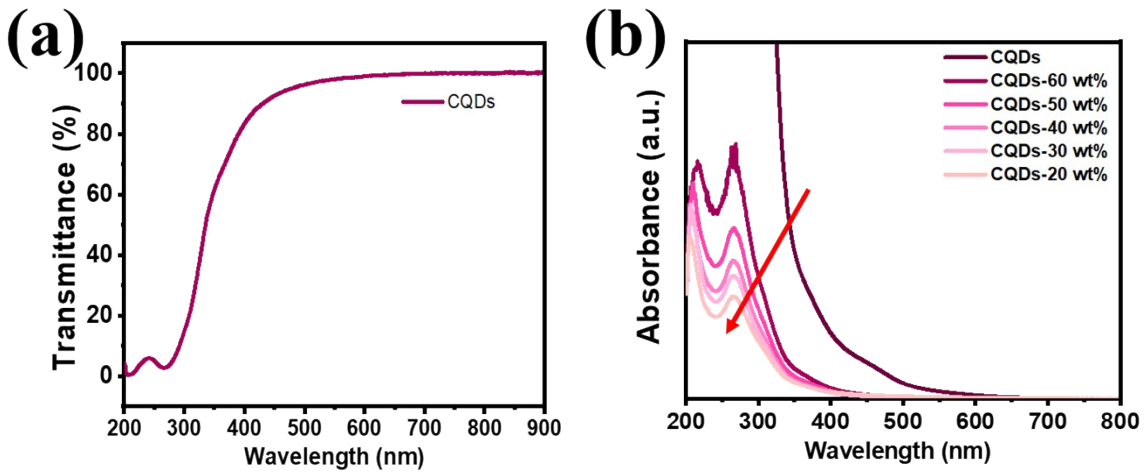


Fig. S1. (a) Transmittance of CQDs, (b) UV-Vis of CQDs at different dilute concentration.

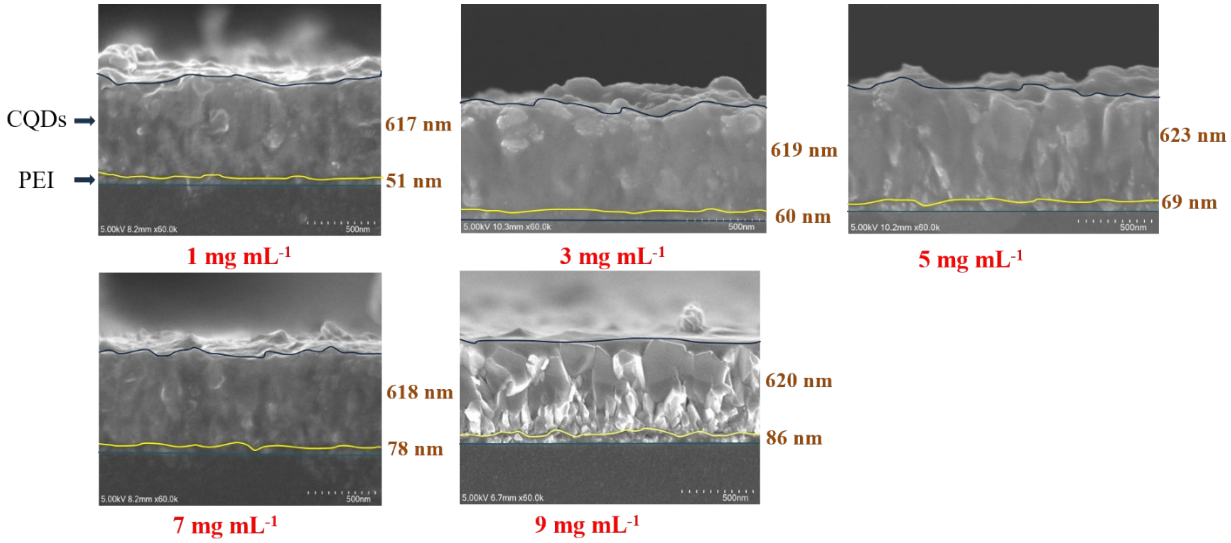


Fig. S2. Cross-sectional SEM image of different solution concentration of PEI at fixed dilute concentration of CQDs-50

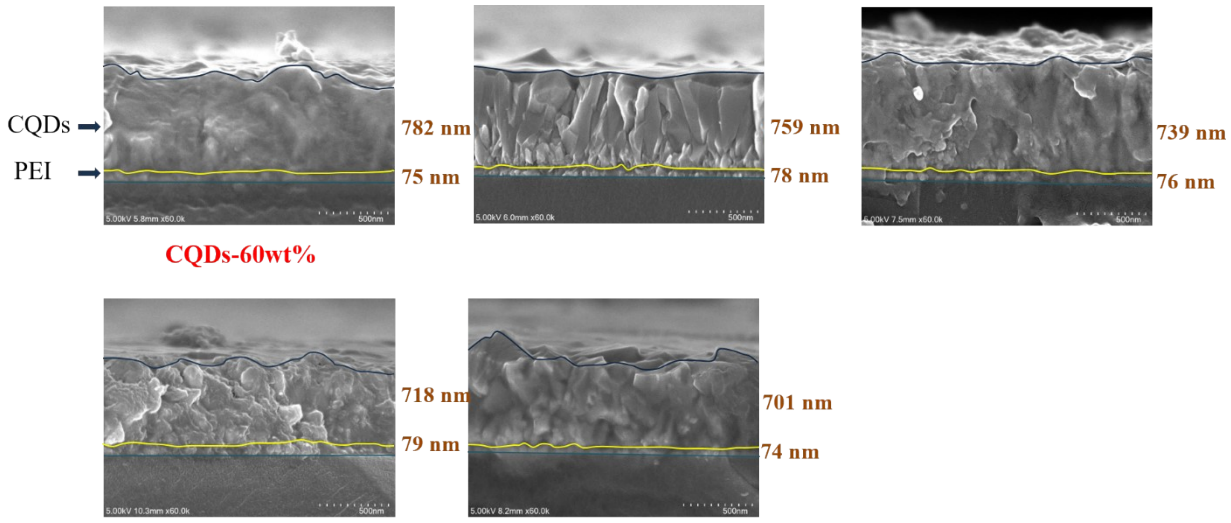


Fig. S3. Cross-sectional SEM image of different dilute concentration of CQDs at fixed solution concentration of PEI-5.

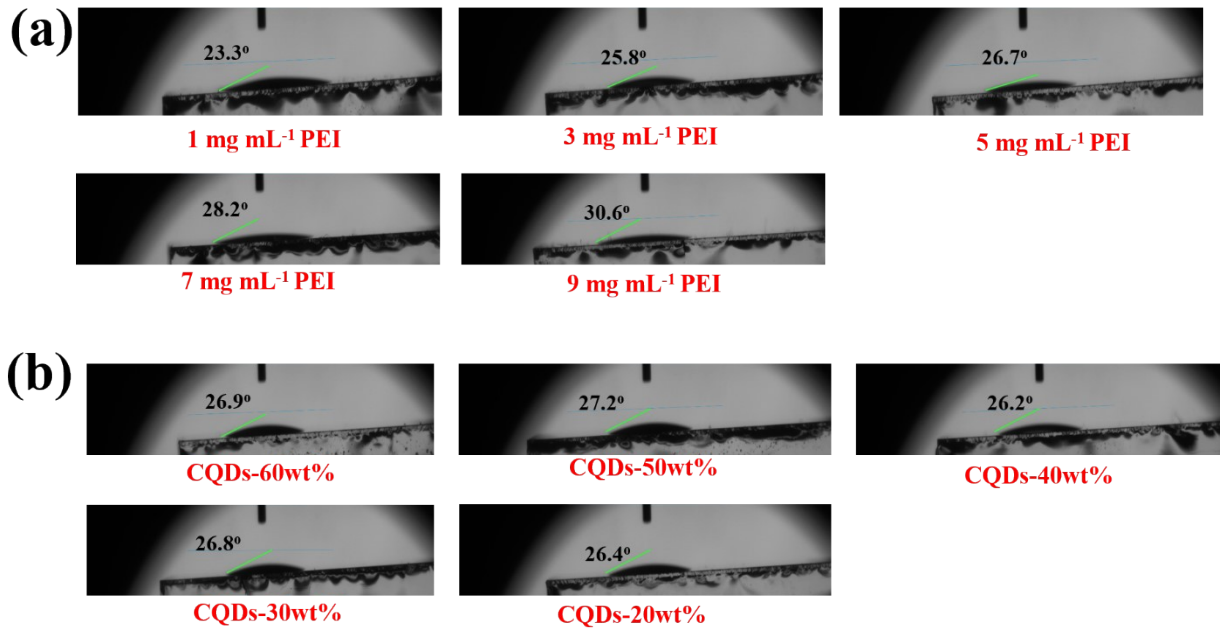


Fig. S4. Contact angel measurement of (a) PEI at different concentration, and (b) CQDs at different dilute concentration.

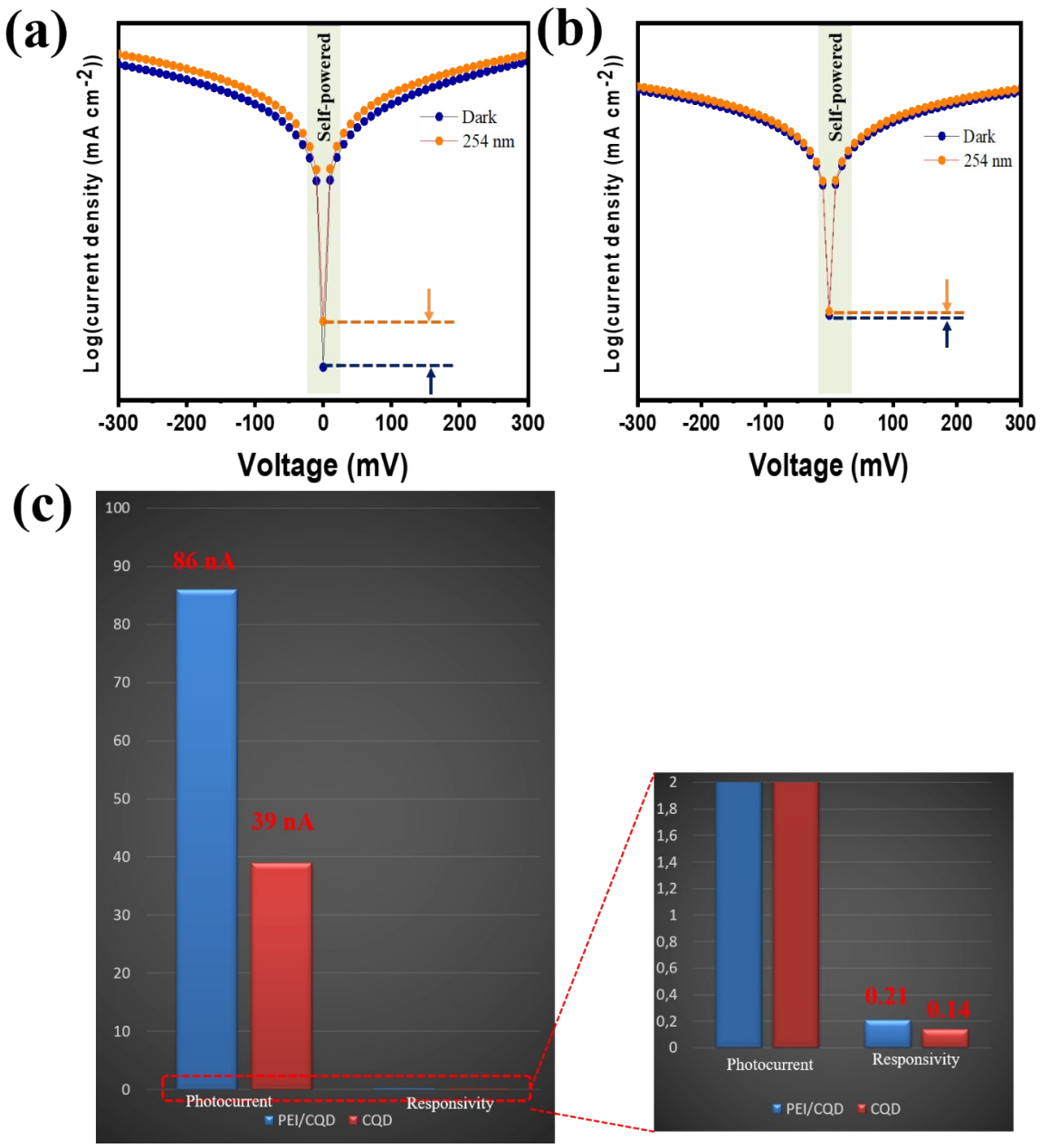


Fig. S5. I-V profile of (a) FTO/glass/PEI/CQDs/PEDO:TPSS/Au, (b) FTO/glass/CQDs/PEDO:TPSS/Au, (c) photocurrent and responsivity of these structure

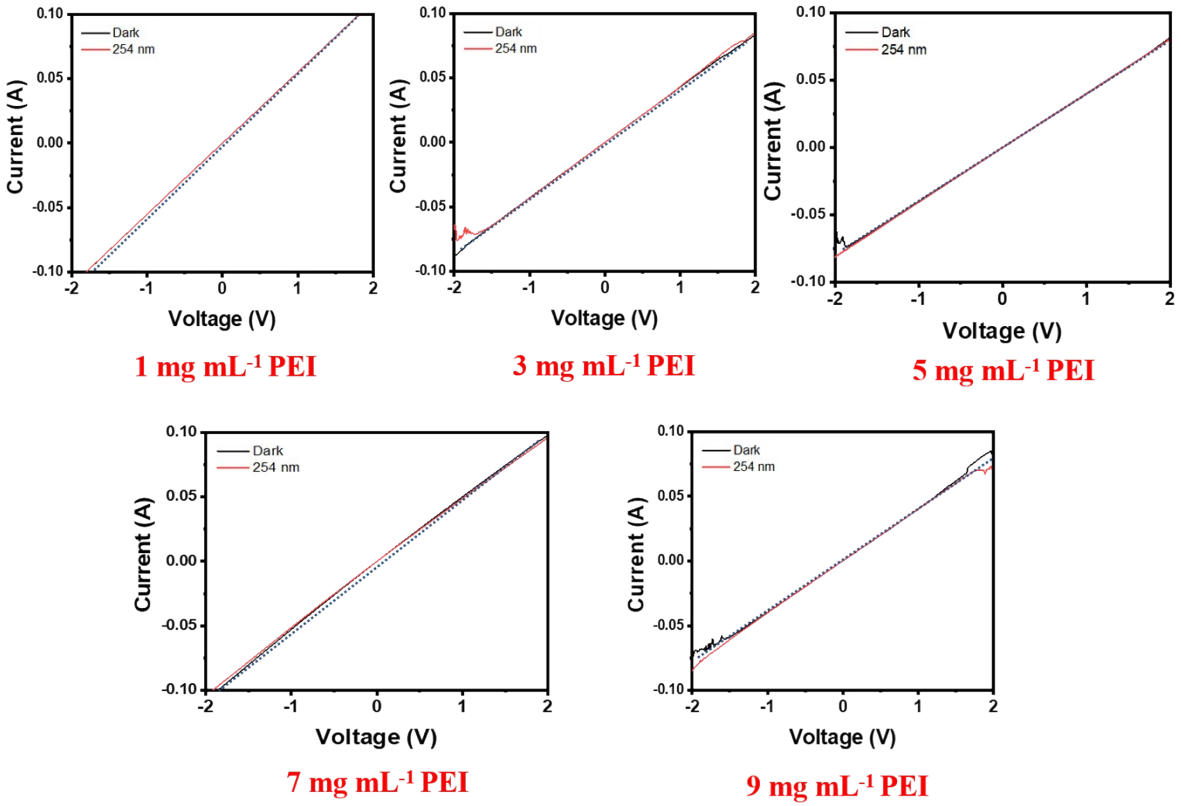


Fig. S6. I-V profile of PEI at different solution concentration

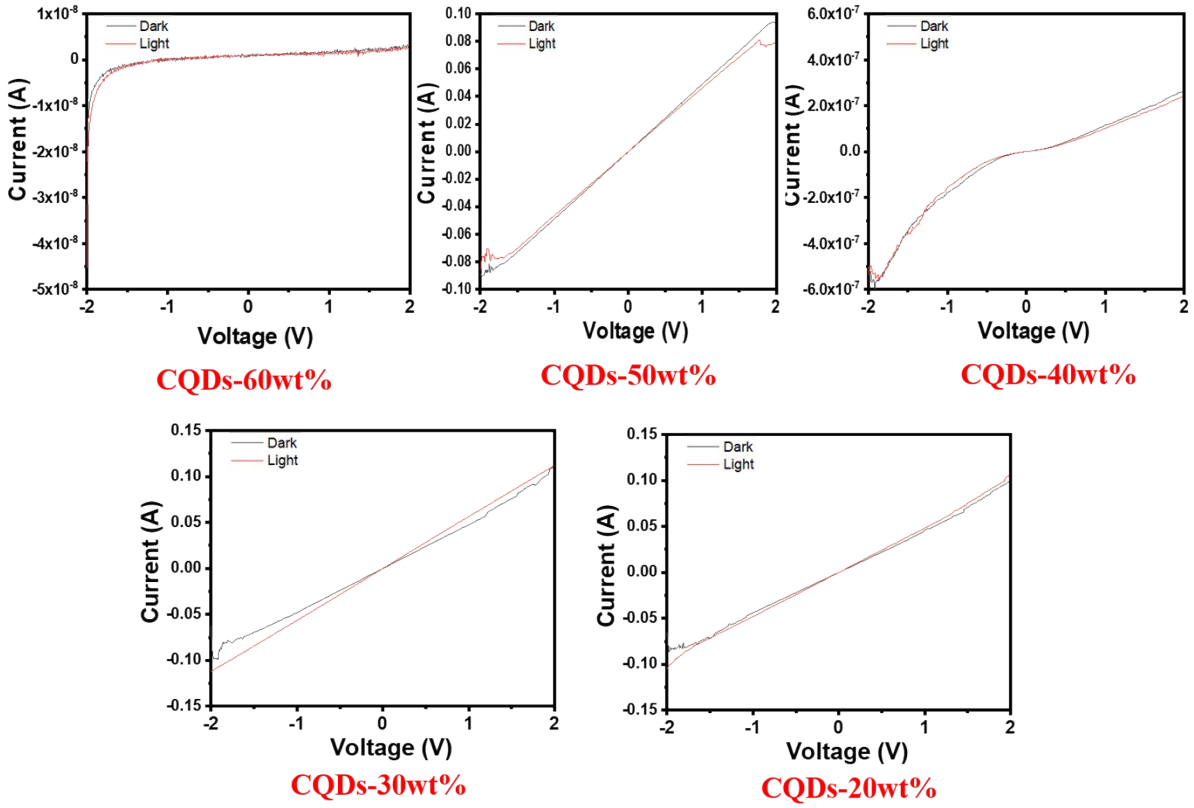


Fig. S7. I-V profile of CQDs at different dilute concentration

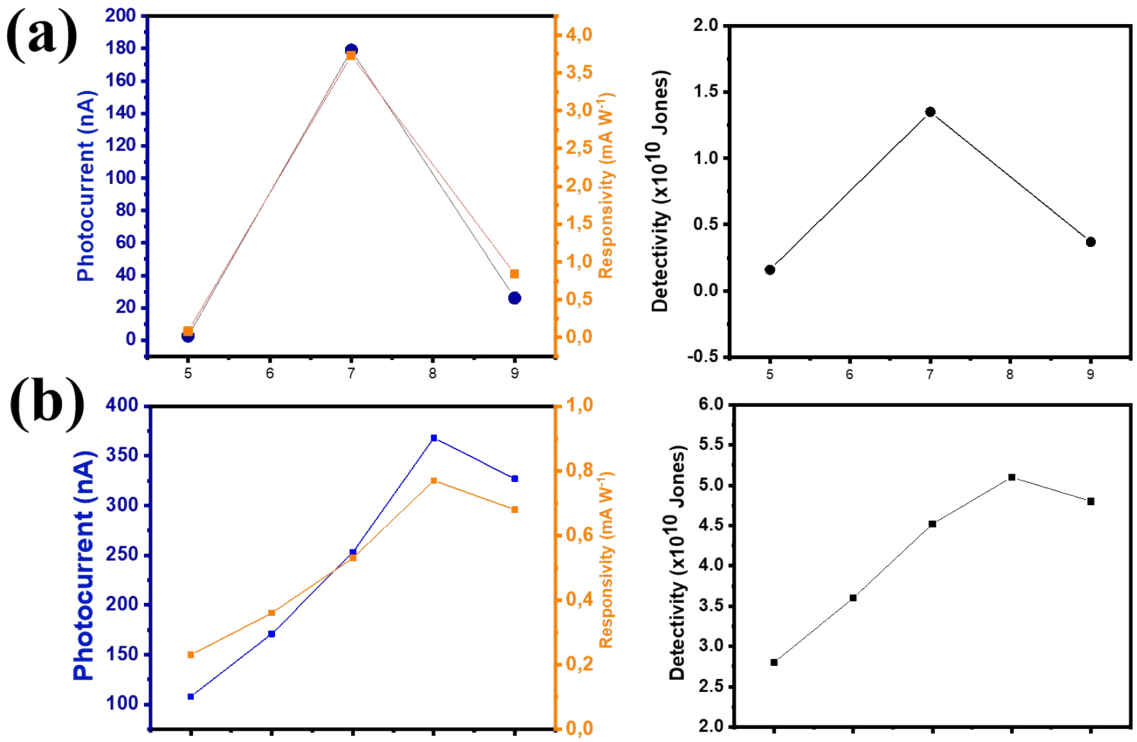
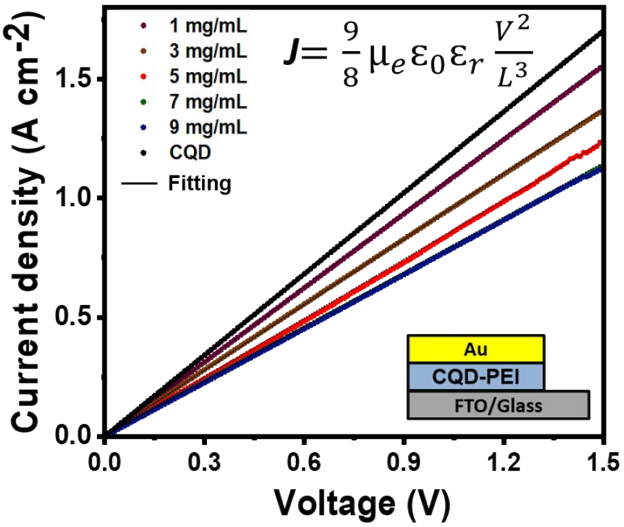


Fig. S8. Photocurrent, responsivity and detectivity of (a) PEI at different solution concentration, and (b) CQDs at different dilute concentration.



❖ The **electron mobility**:

- **CQD**: 2.3x 10^{-4} cm^2 V^{-1} s^{-1}
- **1 mg mL^{-1} PEI**: 4.53 x 10^{-6} cm^2 V^{-1} s^{-1}
- **3 mg mL^{-1} PEI**: 4.1 x 10^{-6} cm^2 V^{-1} s^{-1}
- **5 mg mL^{-1} PEI**: 3.5 x 10^{-6} cm^2 V^{-1} s^{-1}
- **7 mg mL^{-1} PEI**: 3.3 x 10^{-6} cm^2 V^{-1} s^{-1}
- **9 mg mL^{-1} PEI**: 3.3 x 10^{-6} cm^2 V^{-1} s^{-1}

Fig. S9. J-V profile of CQDs at different dilute concentration, where μ_e: Apparent charge carrier mobility, ε_0: vacuum permittivity (1.5×10^{-10}), ε_r: the relative dielectric constant of CQD (4.5), **V**: applied voltage, **L**: the thickness of the film.

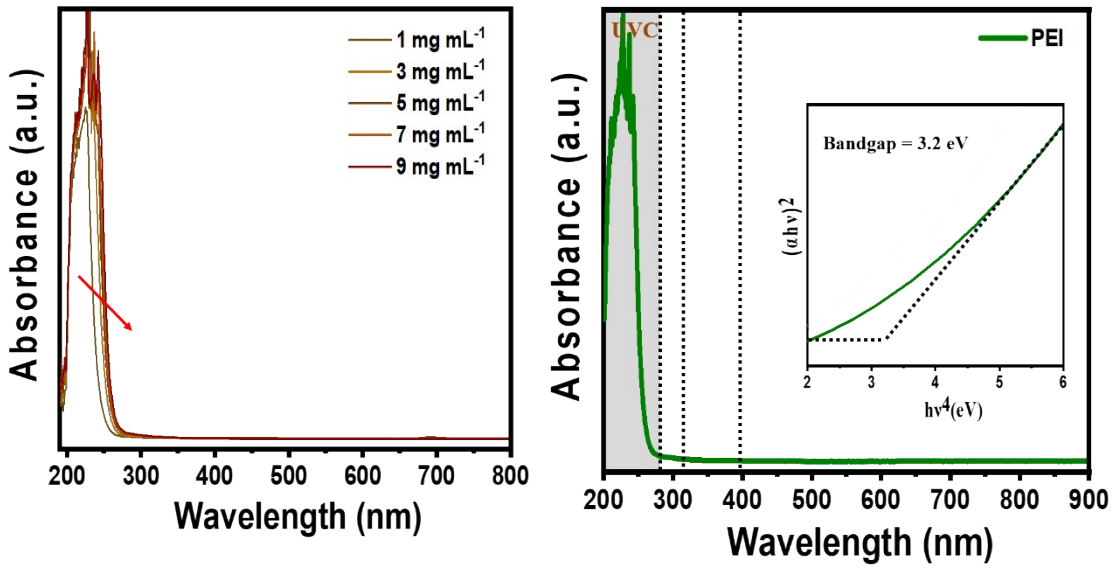


Fig. S10. UV-Vis of (a) PEI at different solution concentration, (b) PEI-7 ((inset: Tauc plot)

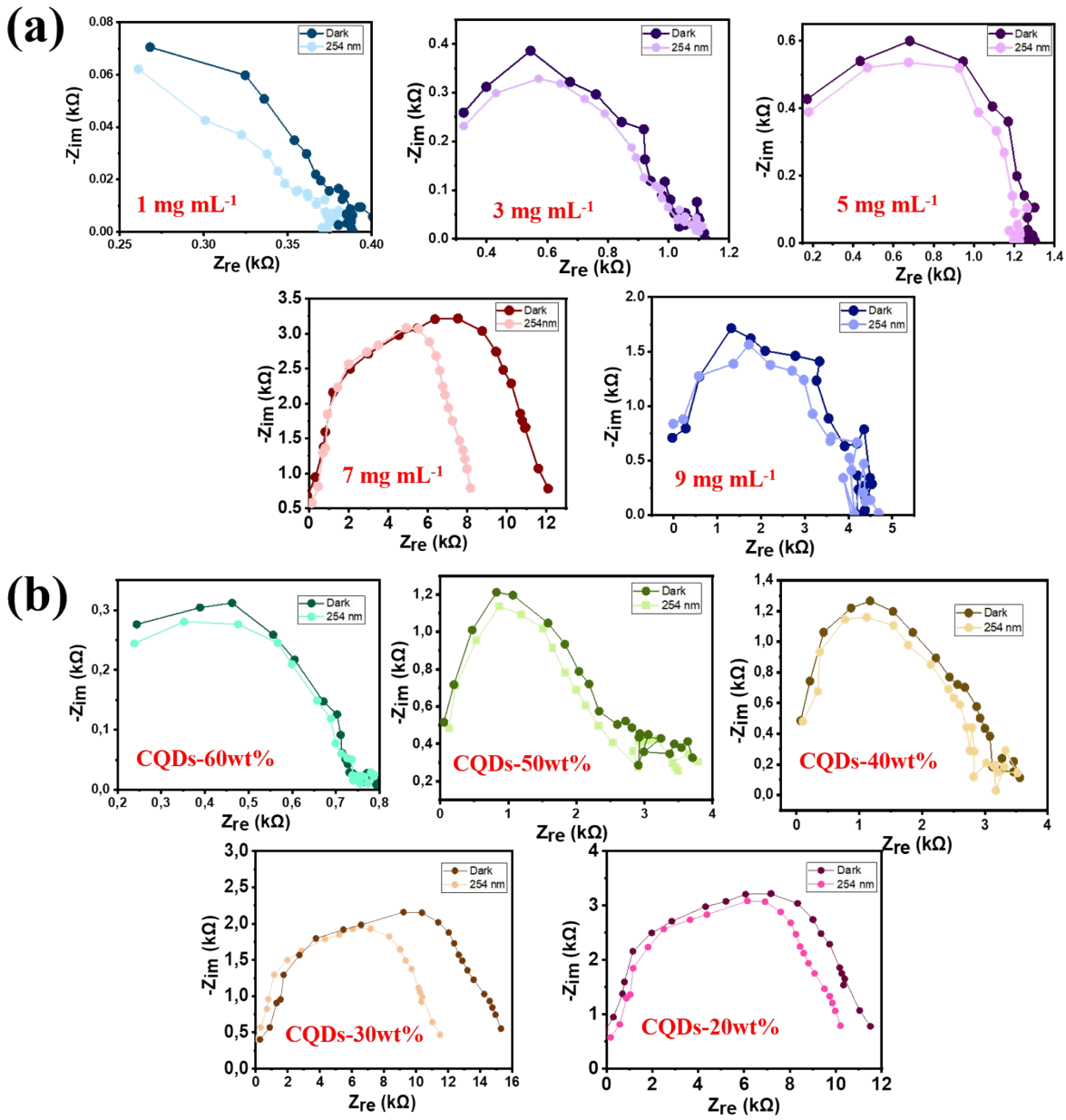


Fig. S11. Nyquist plots of (a) PEI and (b) CQDs at various solution concentrations before and after exposure to light of 254 nm wavelength.

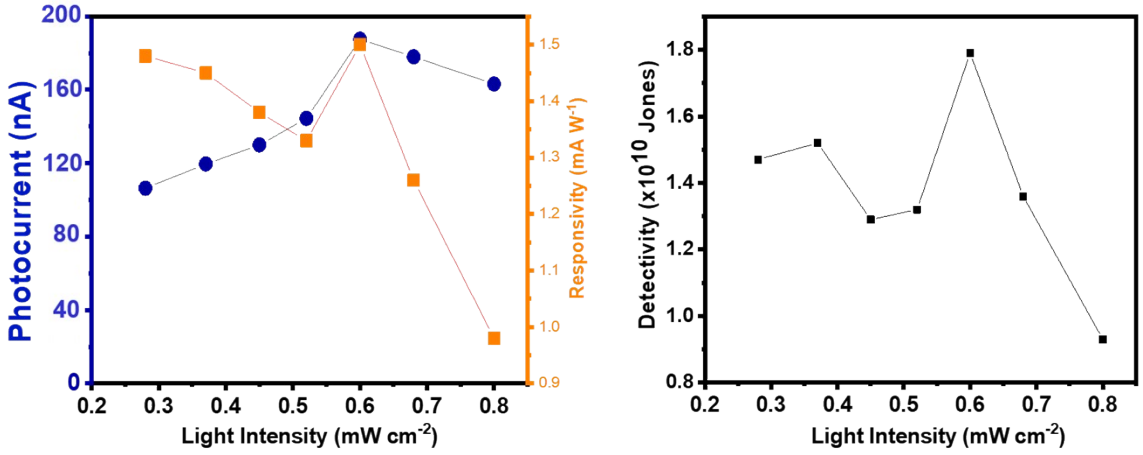


Fig. S12. Photocurrent, responsivity and detectivity of at various light intensity

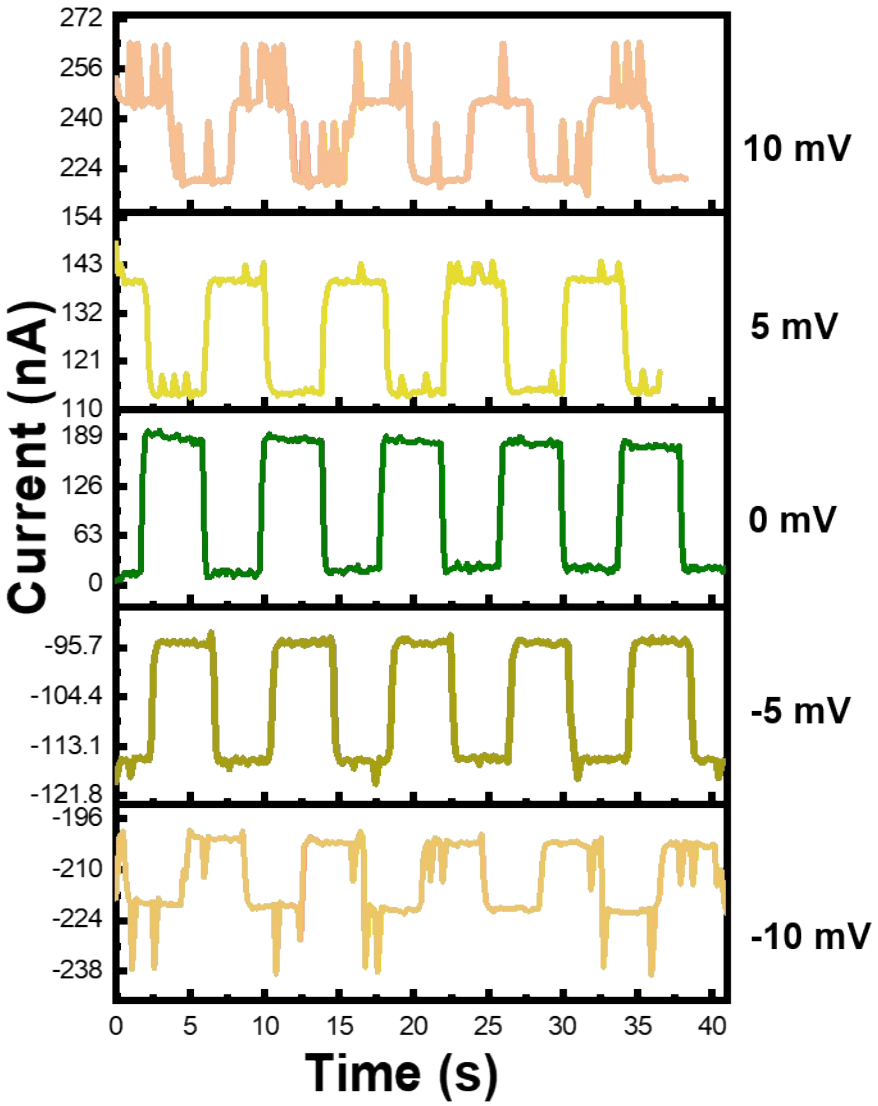


Fig. S13. I-t graph at the bias of -10, -5, 0, 5, and 10 mV under 254 nm light

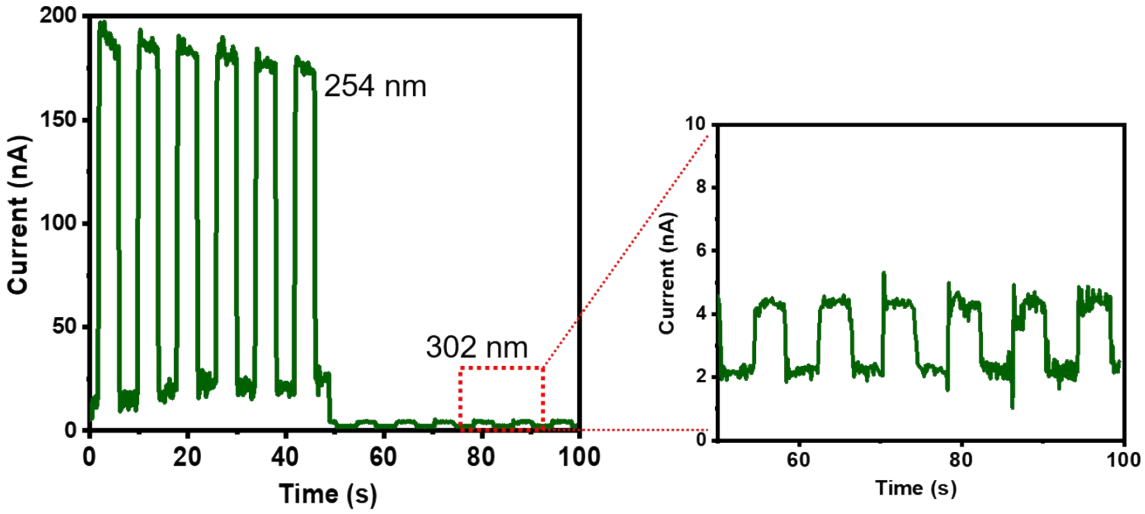


Fig. S14. Photocurrent versus time for photodetector under UVC and UVB illumination with an intensity of 0.6 mW cm^{-2}