

Supporting Information

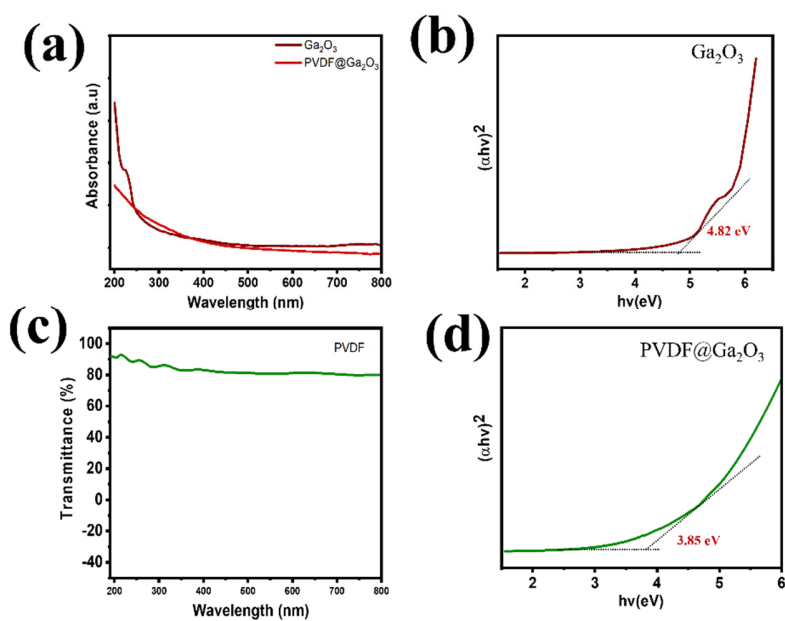
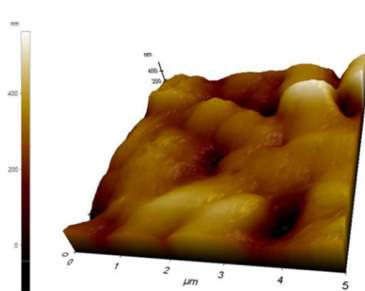
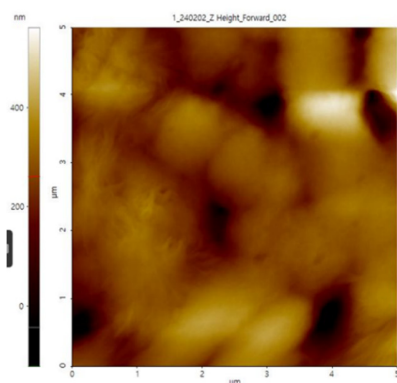


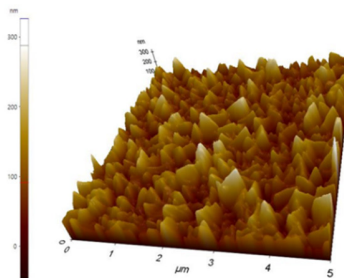
Figure S1. (a) Absorbance of Ga_2O_3 and $\text{PVDF@Ga}_2\text{O}_3$, (b) Tauc plot of Ga_2O_3 , (c) Transmittance of PVDF, and (d) Tauc plot of $\text{PVDF@Ga}_2\text{O}_3$



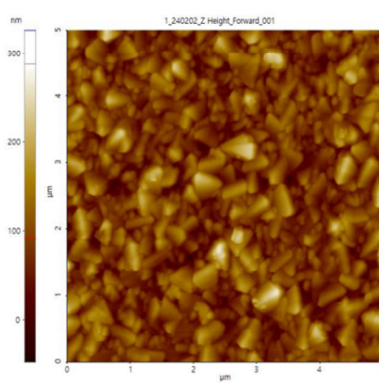
RMS=83.9 nm



PVDF



RMS=42.0nm



PVDF@Ga₂O₃

Figure S2. AFM image of PVDF and PVDF@Ga₂O₃

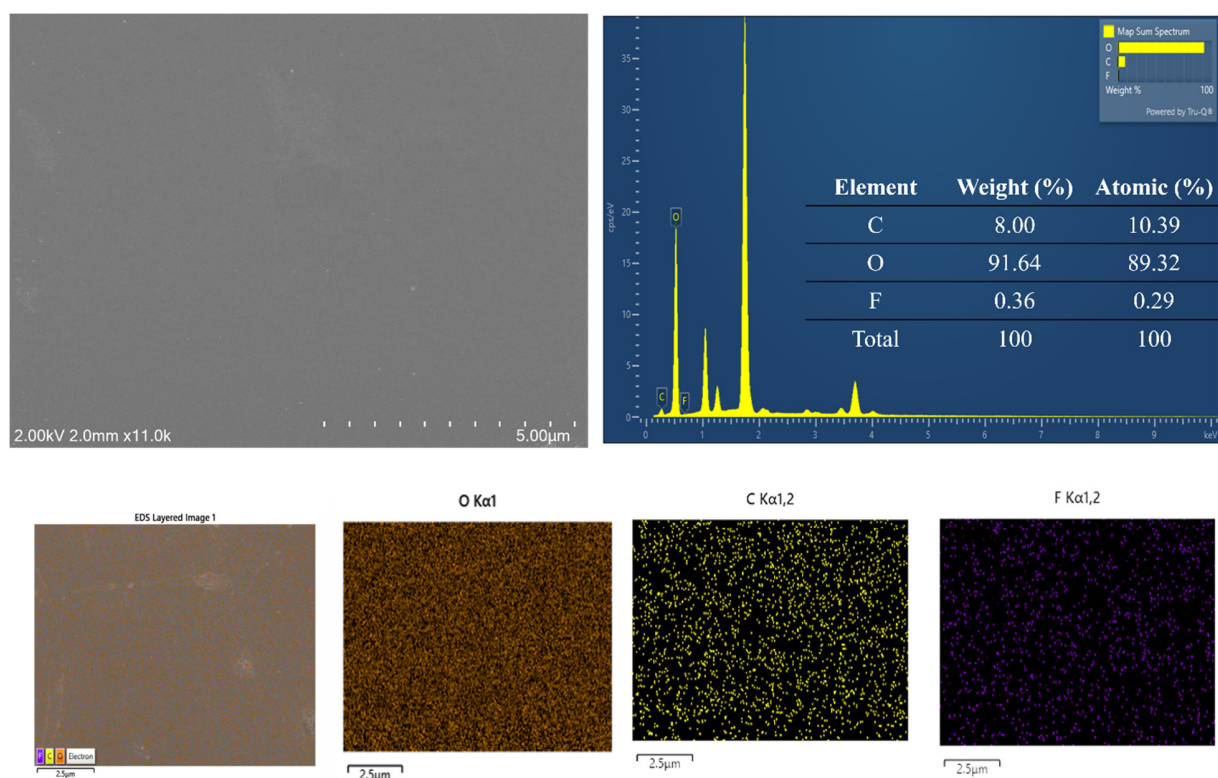


Figure S3. EDX analysis and elemental mapping of PVDF matrix

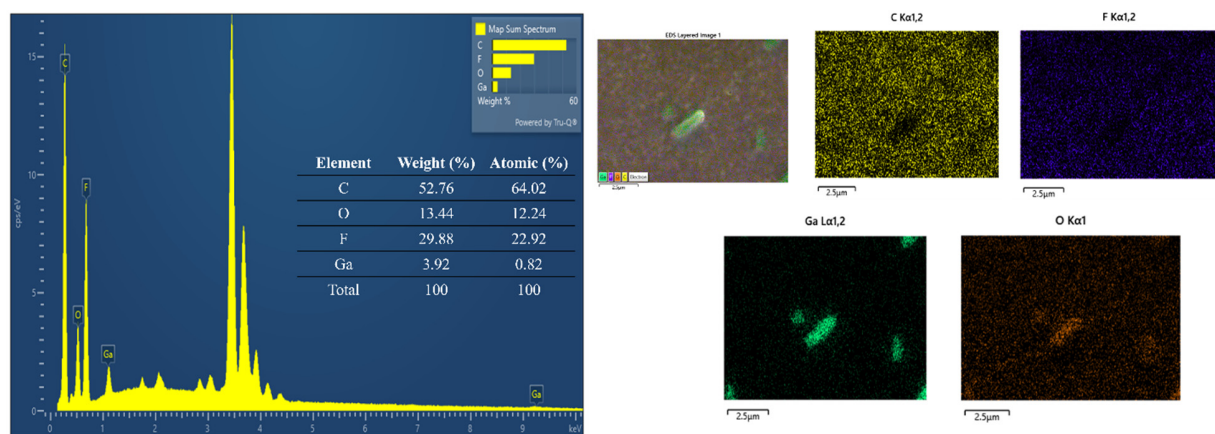


Figure S4. EDX analysis and elemental mapping of PVDF@Ga₂O₃ matrix

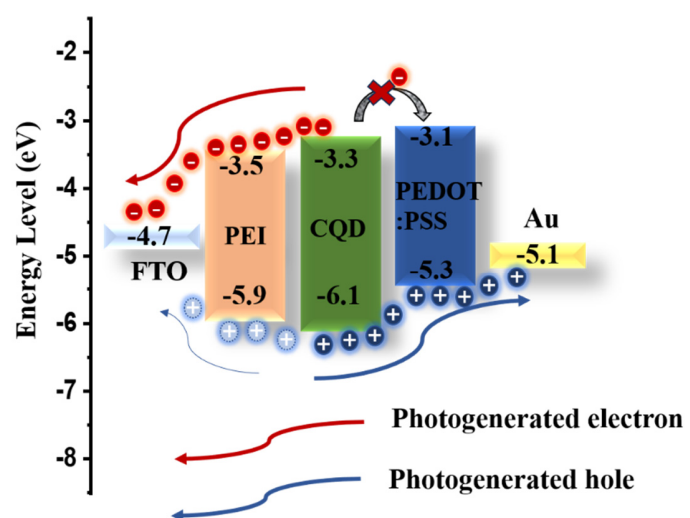


Figure S5. Band diagram of PD device (FTO/PEI/CQD/PEDOT:PSS/Au)

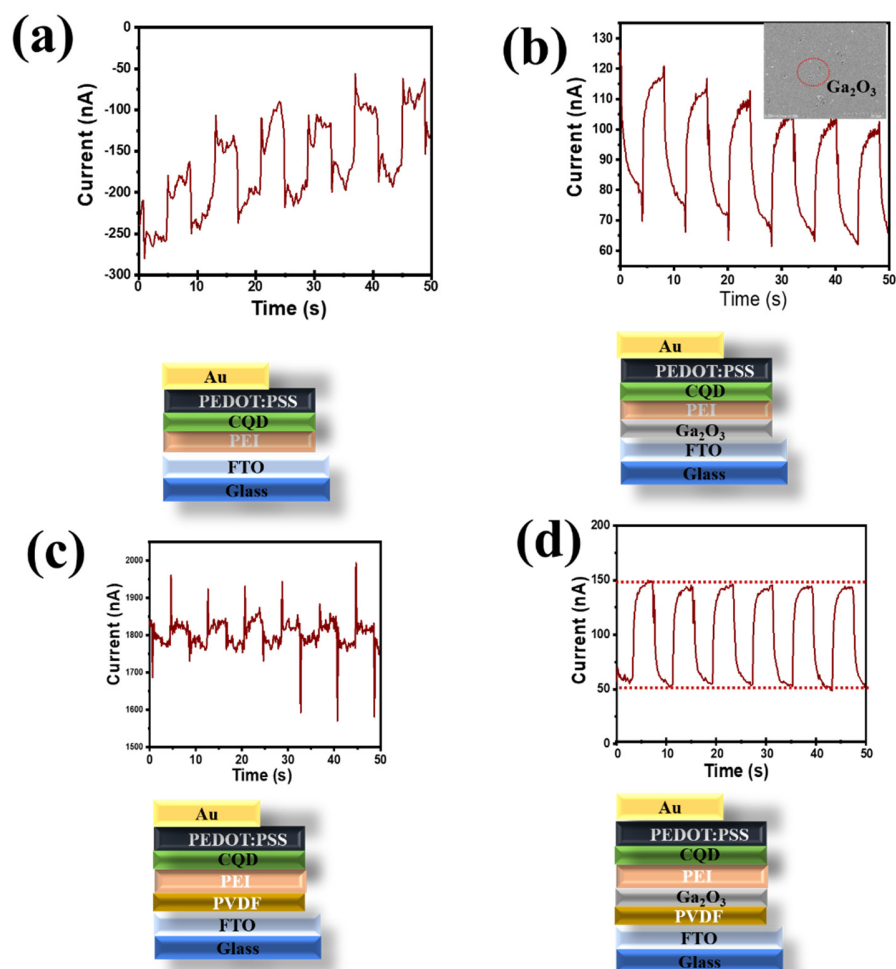


Figure S6. Photoreponse of different PD devices.

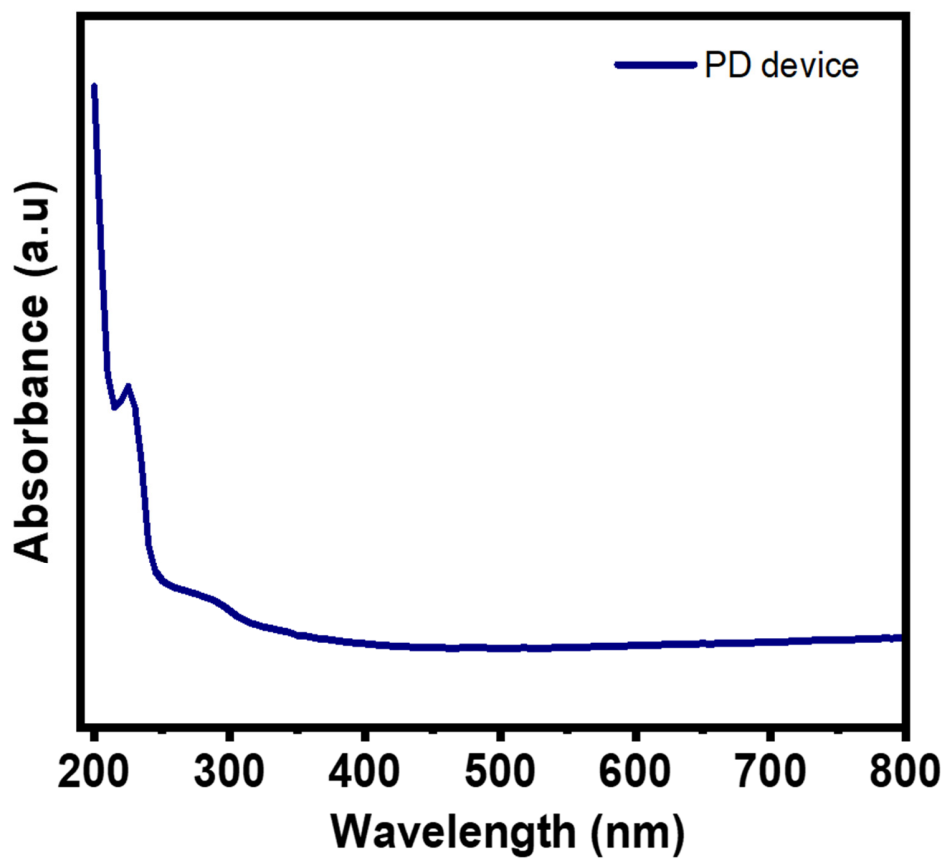


Figure S7. Absorbance of PD device

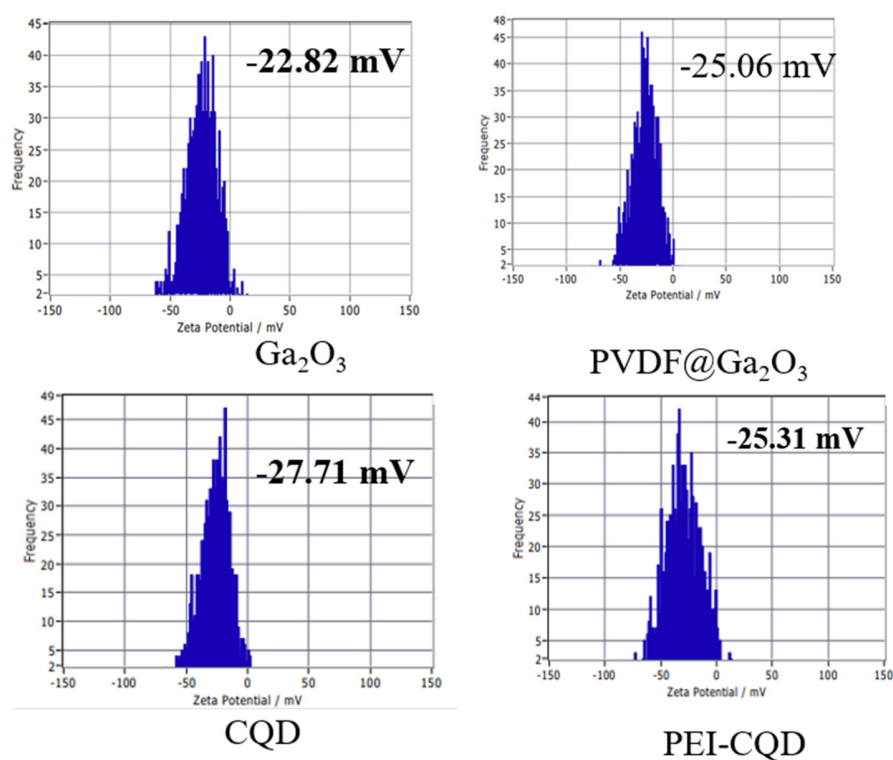


Figure S8. Zeta potential of Ga₂O₃, PVDF@Ga₂O₃, CQD, and PEI@CQD.

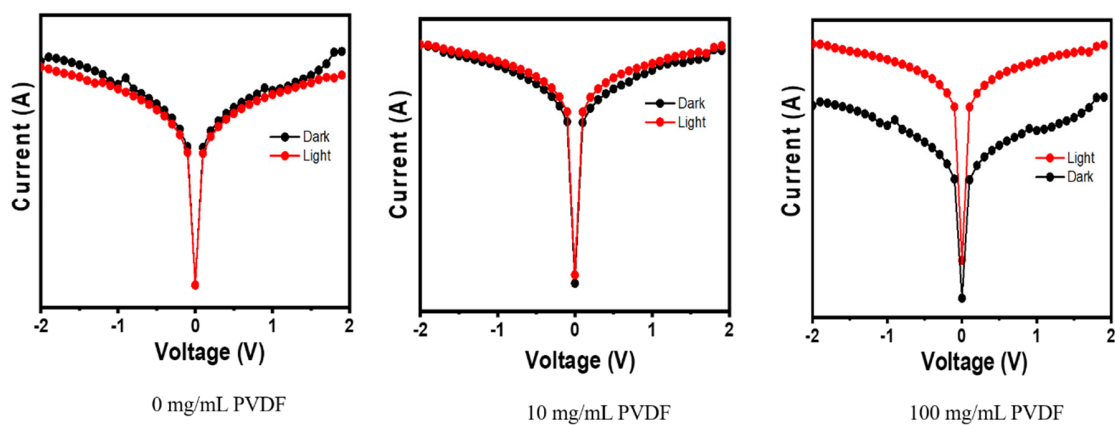


Figure S9. semi-logarithmic I-V curves of PD under dark and UVC illumination at different content of PVDF

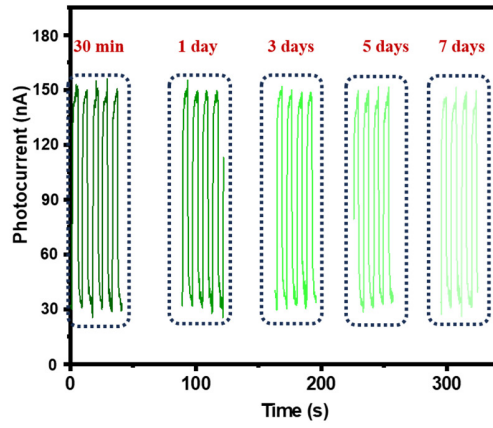
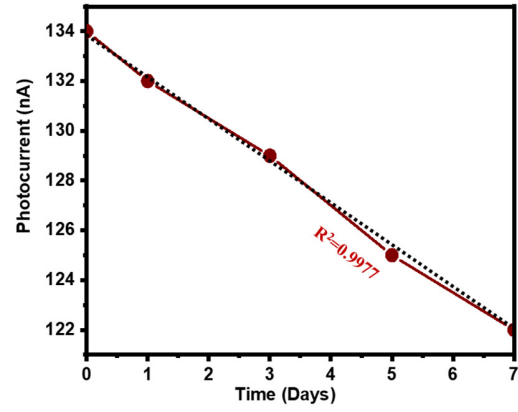
(a)**(b)**

Figure S10. (a) Photoresponse of the PD device is stored in 7 days, and (b) photocurrent changed as a function of time.

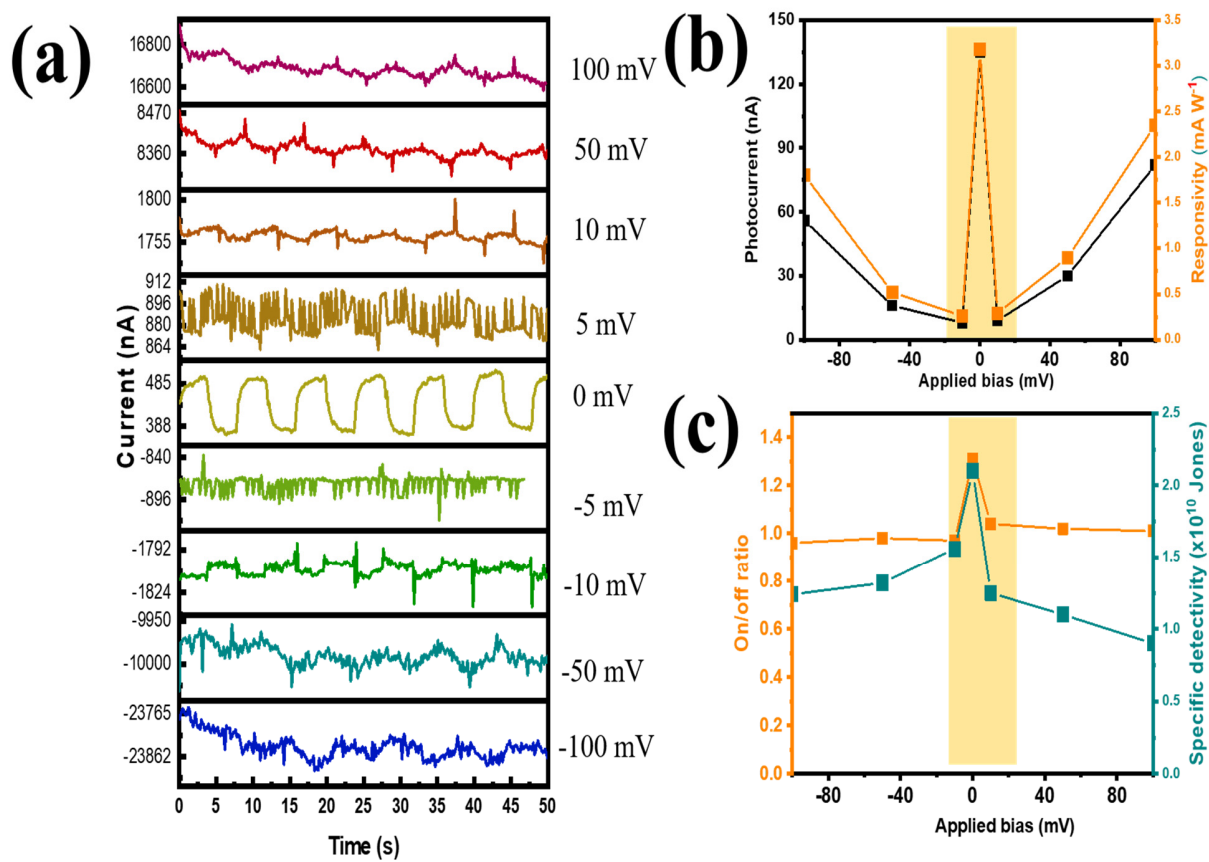


Figure S11. (a) Photoresponse, (b) Photocurrent and Responsibility, and (c) On/off ratio and specific detectivity of PD device at different bias voltage.

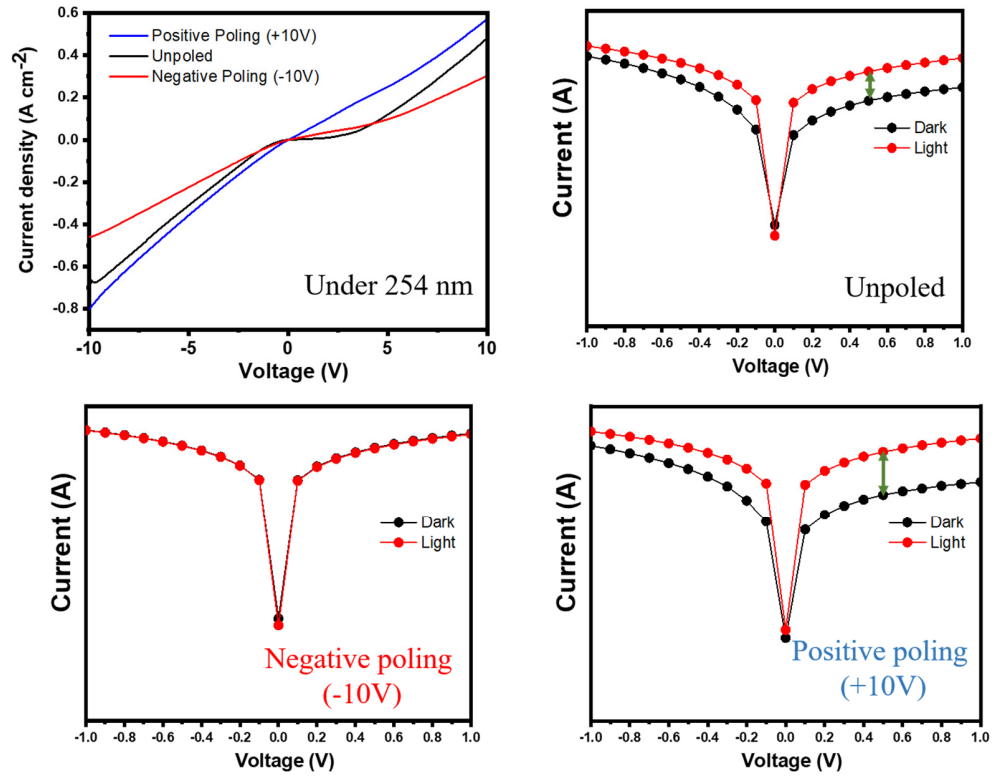


Figure S12. (a) Linear and (b) semi-logarithmic I-V curves of PD under dark and UVC illumination at different poling voltage.

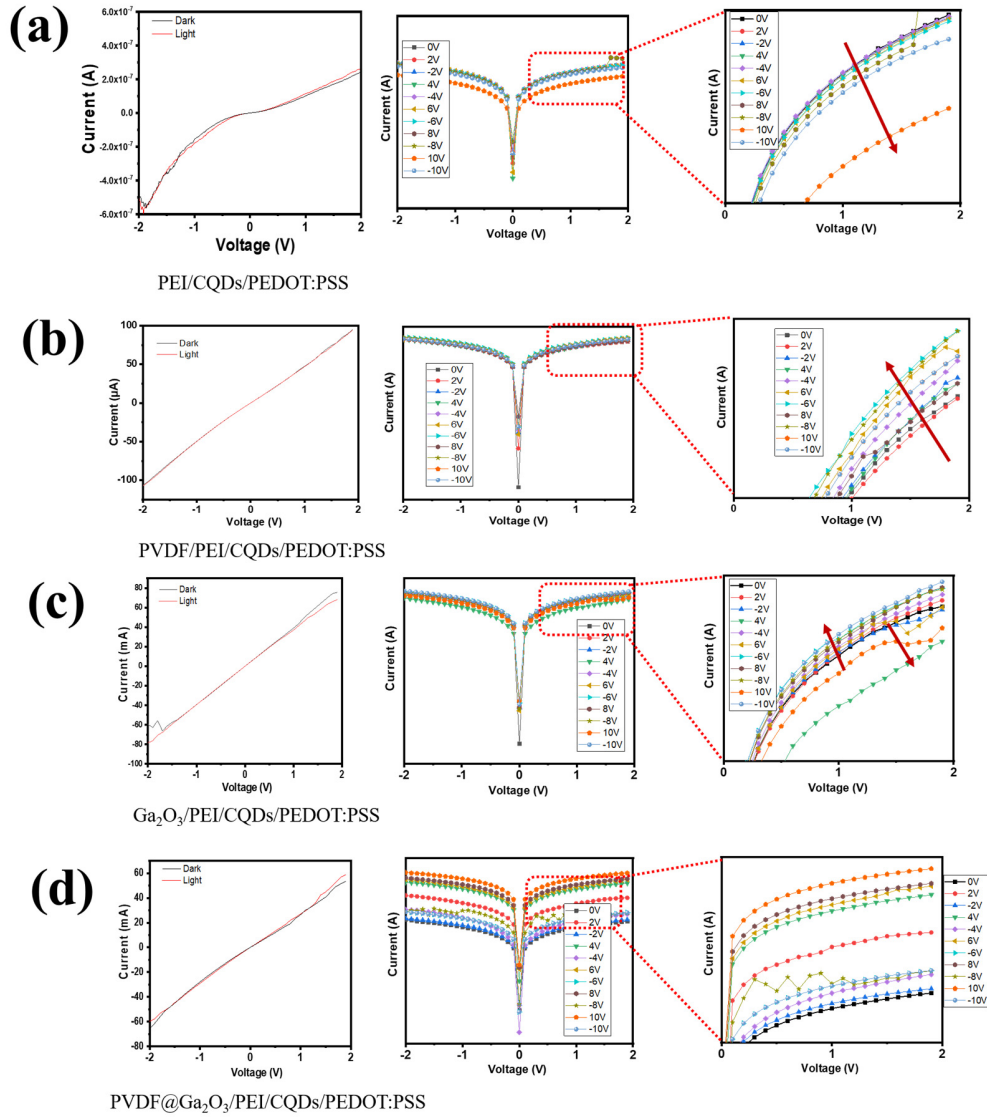


Figure S13. Linear and semi-logarithmic I-V curves of PD under dark and UVC illumination at different poling voltage at (a) PEI/CQDs/PEDOT:PSS, (b) PVDF/PEI/CQDs/PEDOT:PSS, (c) Ga₂O₃/PEI/CQDs/PEDOT:PSS, and (d) PVDF@Ga₂O₃/PEI/CQDs/PEDOT:PSS

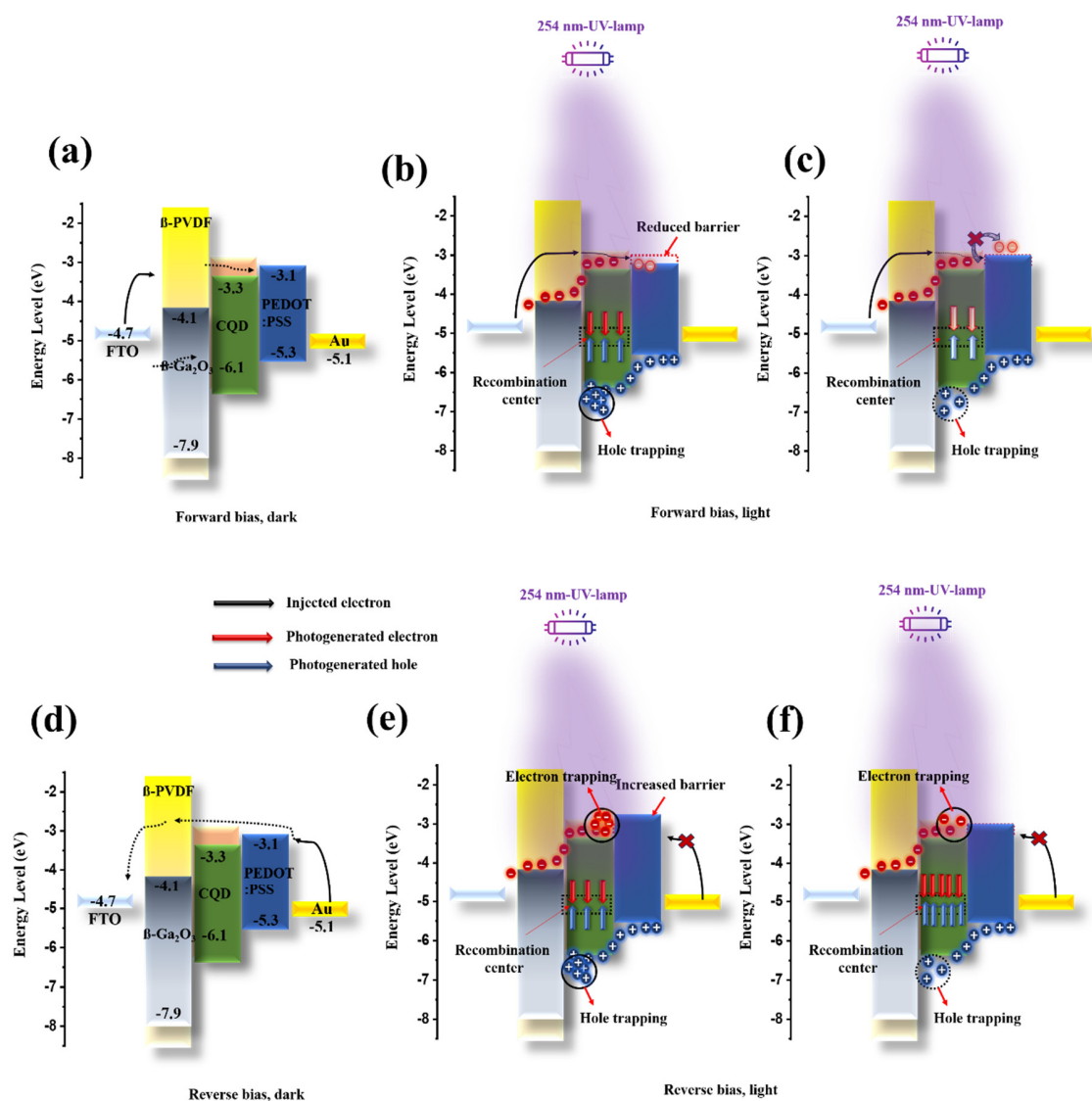


Figure S14 . Working mechanism of PVDF@Ga₂O₃ at (a) dark conditions and (b-c) UVC light illumination under forward bias, and (d) dark conditions and (e-f) UVC light illumination under reverse bias

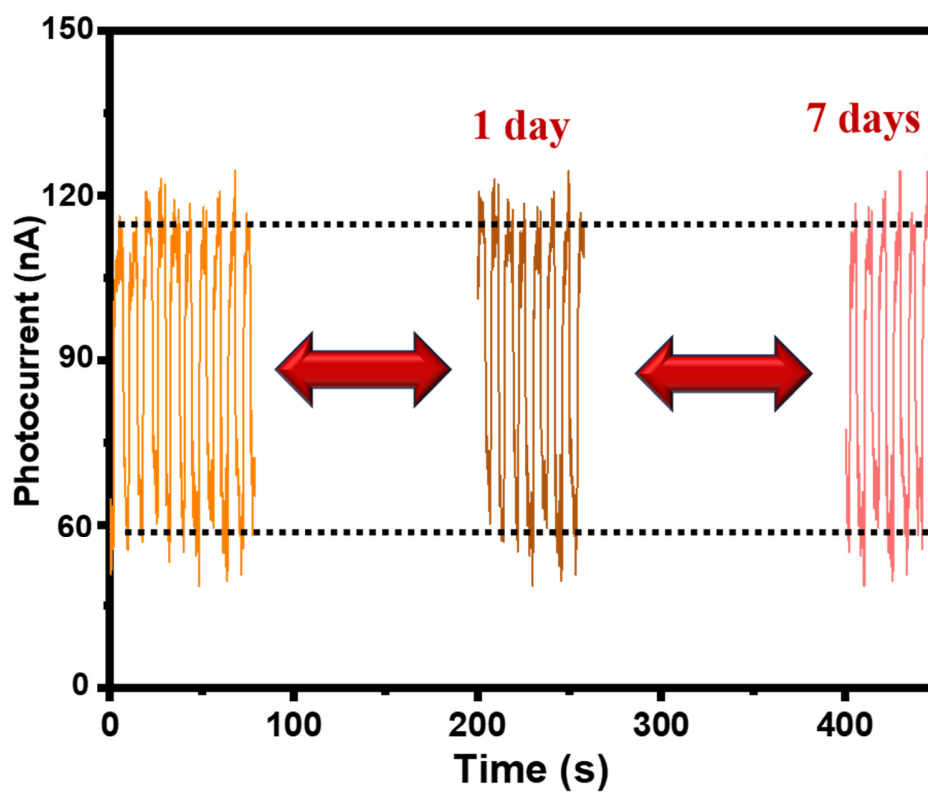


Figure S15. Photorespon of PD device under forward bias (+ 10V) after several days in the after a prolonged storage in dark condition.