Electronic Supplementary Information

Photoresponse of polyaniline-functionalized graphene quantum dots

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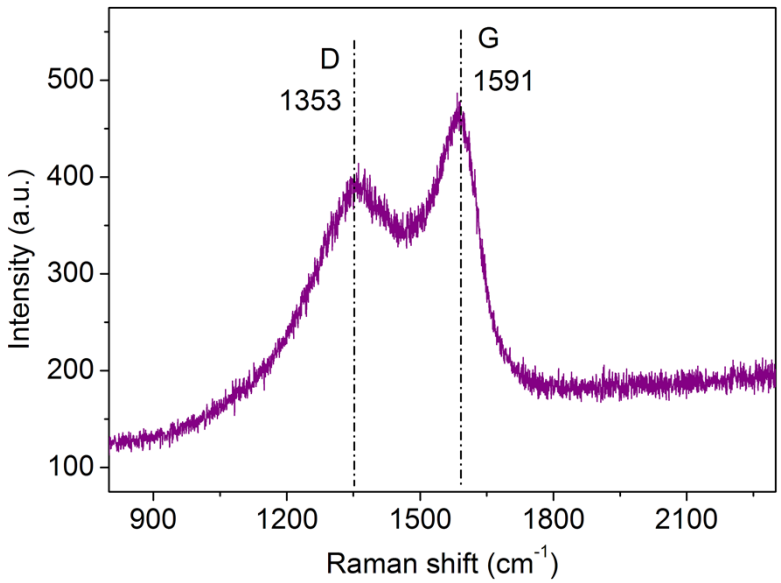

Fig. S1 The Raman spectrum of the PANI-GQD. It exhibits two characteristic peaks. The D peak located at 1353 cm^{-1} arises from the scattering at the edges of defects in the graphene plane. The G peak located at 1591 cm^{-1} arises from the in-plane vibrations of sp^2 carbon.[22] The measurement was conducted in Horiba Jobin Yvon HR800 Raman system with a laser wavelength of 488 nm at room temperature.

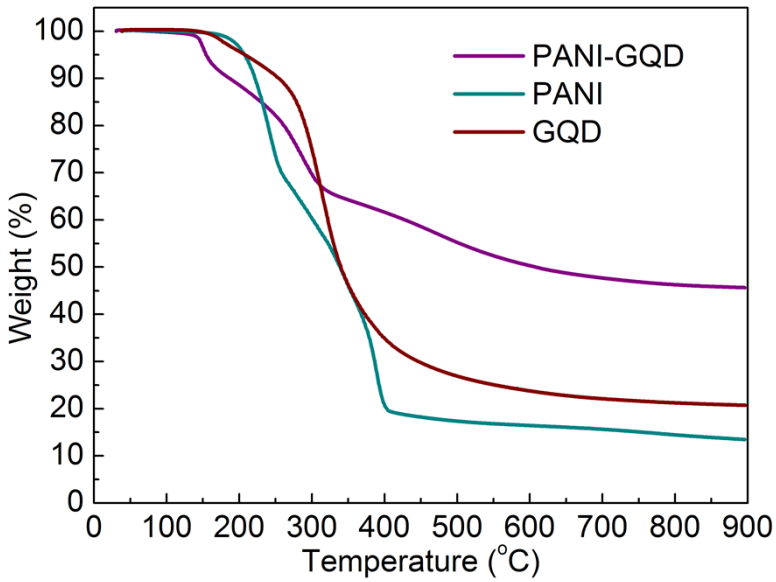

Fig. S2 The thermogravimetric analysis (TGA) of PANI-GQD, PANI and GQD carried out in argon environment. The weight losses of PANI-GQD, GQD and PANI when heated up to 900 ^{o}C are 54%, 80% and 86% respectively. The weights of GQD and PANI decrease drastically in the range of 200-400^{o}C, which corresponds to the decomposition of oxygenated and hydrogenated function groups. However, the weight of PANI-GQD only shows mild decay for temperature above 300 ^{o}C, which demonstrates a higher thermal stability.

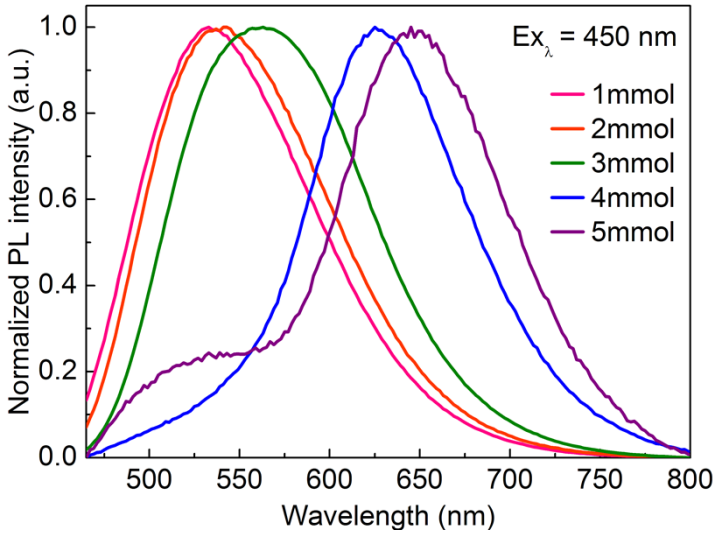

Fig. S3 Red-shift of PL peaks of the PANI-GQD with increasing amount of aniline (1-5mmol) added in the synthesis. It demonstrates the tunable PL of the PANI-GQD solely by controlling the amount of aniline.

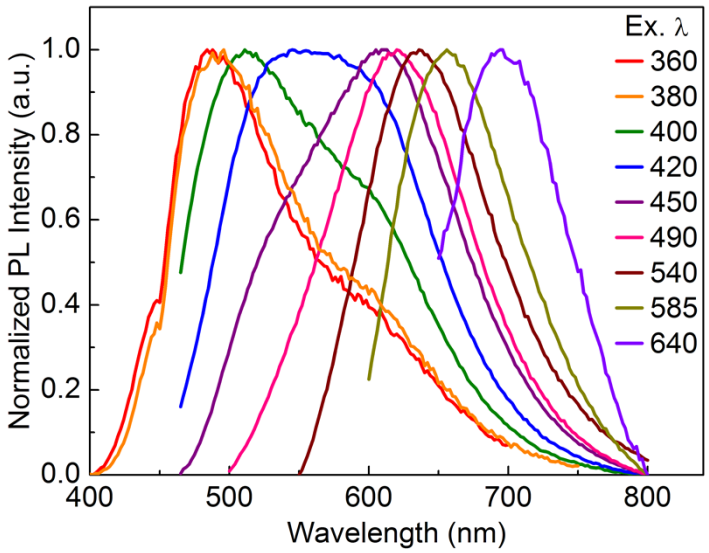

Fig. S4 Excitation wavelength dependent PL of the PANI-GQD. The PL peaks red-shift with longer excitation wavelength.

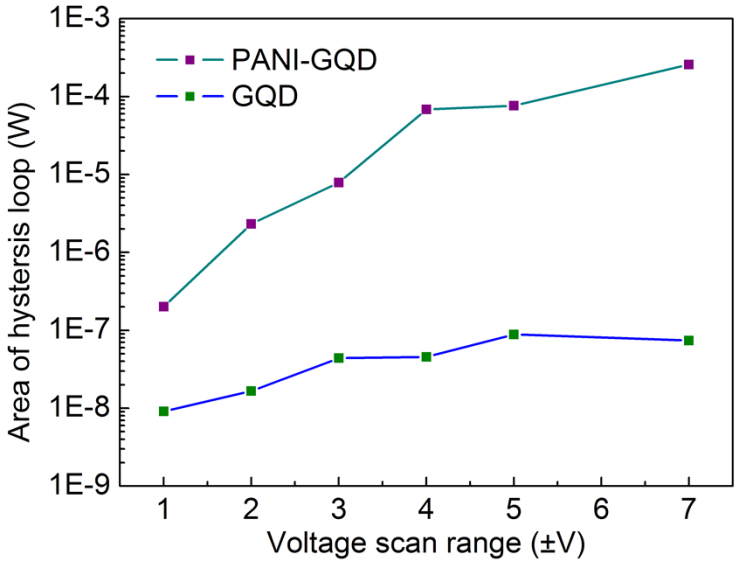

Fig. S5 Area of the hysteretic *I-V* loop for different voltage scan ranges of ± 1, 2, 3, 4, 5, 7 V of the PANI-GQD and GQD. The PANI-GQD device exhibits larger memory effect than the GQD for different voltage ranges.

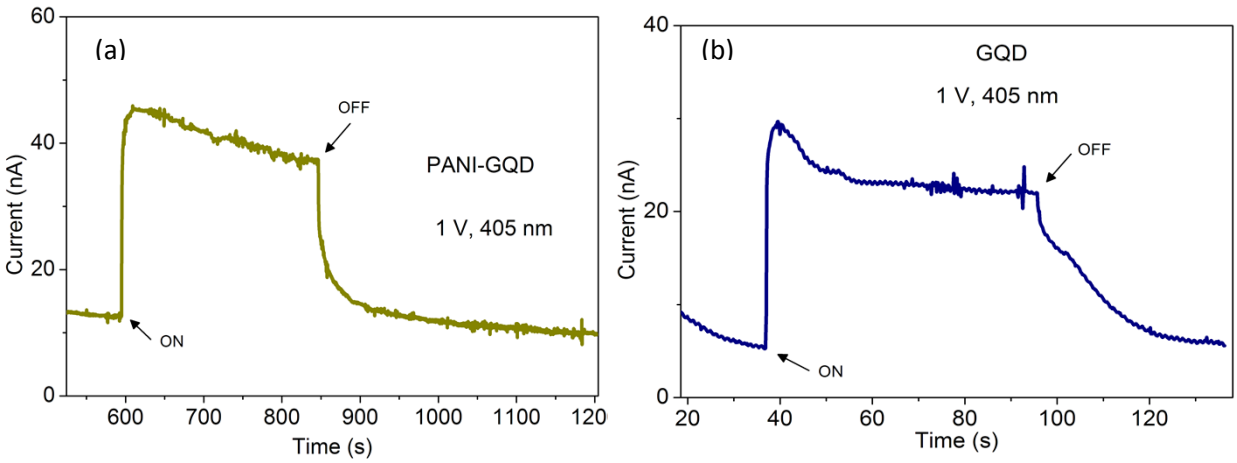

Fig. S6 Under prolonged illumination at 405 nm and 1 V bias for the (a) PANI-GQD and (b) GQD. Positive photocurrents are obtained throughout the illumination at 1 V for both the PANI-GQD and GQD.

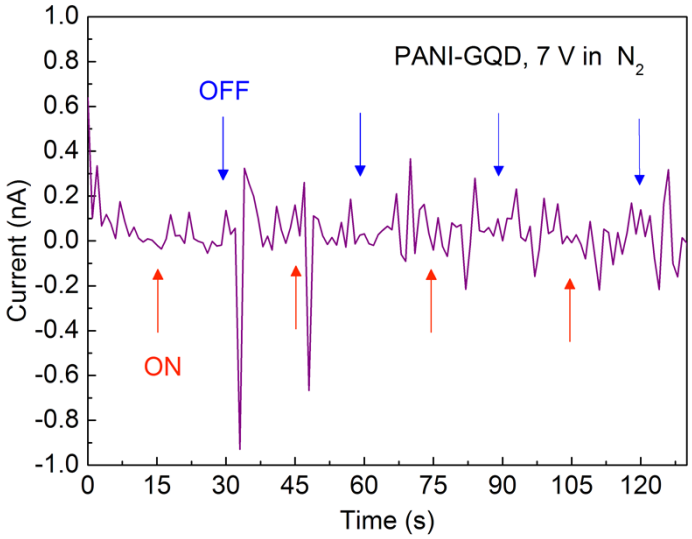

Fig. S7 Current-time measurement of PANI-GQD device in N_2 environment at a bias voltage of 7 V. Arrows indicate the on and off of the 405 nm laser diode.