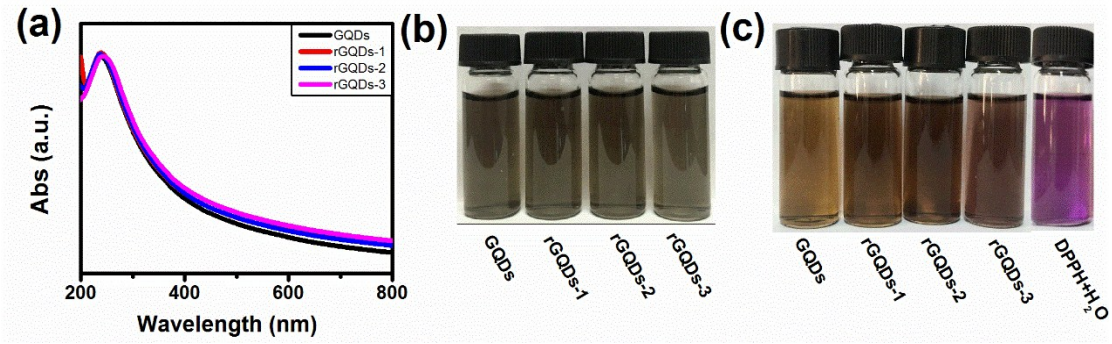

Fig.S1. (a) The UV-Vis absorption of different GQDs ; (b) a photograph of GQDs and rGQDs with different level; (c) a photograph of GQDs and rGQDs after scavenging DPPH• free radical

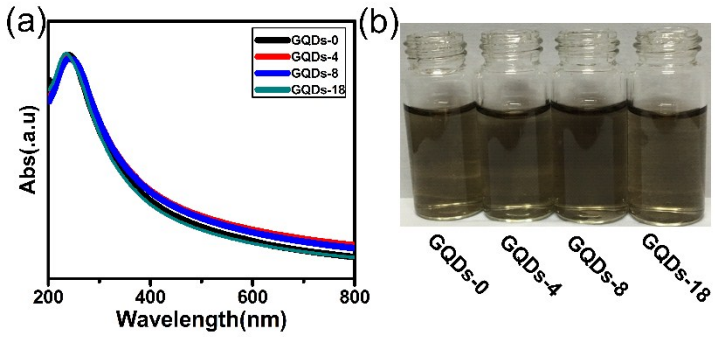

Fig.S2. (a) The UV-Vis absorption of different $GQDs_{0\text{-}18}$, (b) a photograph (from left to right) is $GQDs_{-0}$, $GQDs_{-4}$, $GQDs_{-8}$, $GQDs_{-18}$ respectively.

From the UV-Vis absorption spectrum in **Fig.S1 and S2**, it can be seen that, after the concentration adjustment, a similar absorption behavior at ca. 237 nm was shown. This absorption peaks were caused by the transition from π to π* of carbon-carbon bonds[1].

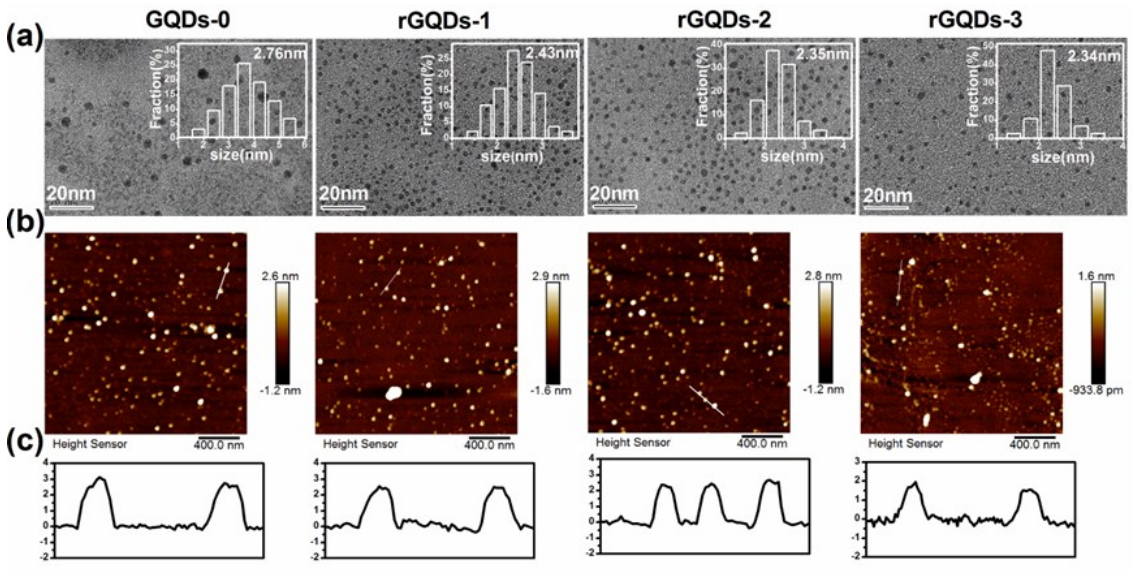

Fig.S3 (a) TEM images and size distributions (inserts) of GQDs, rGQDs$_{-1}$, rGQDs$_{-2}$, and rGQDs$_{-3}$. (b) AFM image and (c) its height distribution of GQDs, rGQDs$_{-1}$, rGQDs$_{-2}$ and rGQDs$_{-3}$.

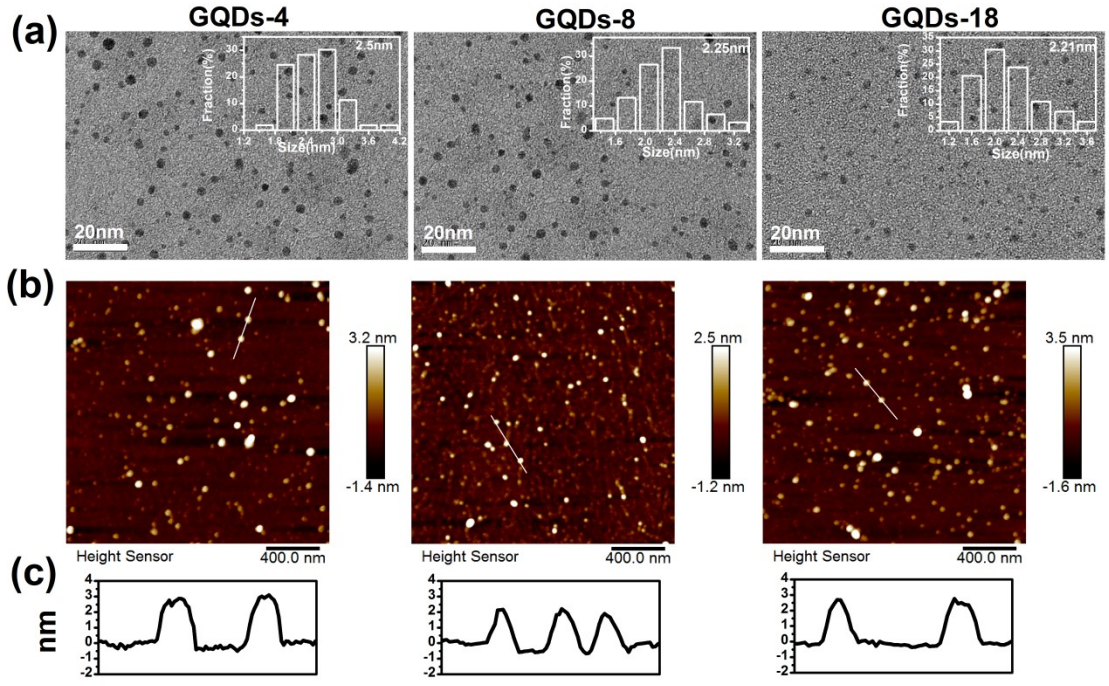

Fig. S4 (a) TEM images and size distributions (inserts) of GQDs$_{-4}$, GQDs$_{-8}$, and GQDs$_{-18}$. (b)AFM image and (c) its height distribution of GQDs$_{-4}$, GQDs$_{-8}$, and GQDs$_{-18}$.

The TEM and AFM images and their height profiles of each kind of GQDs are shown in **Fig. S3 and S3**, The white dots in **Fig.S3b** and **S4b** represent GQDs and their specific point thickness values are shown in **Fig.S3c**.

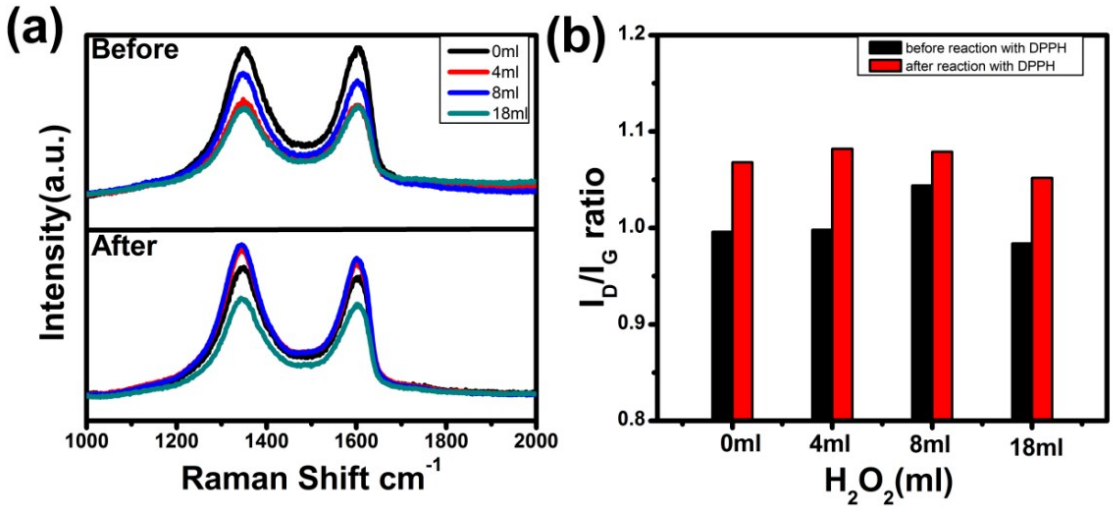

Fig. S5. (a) Raman spectra beforeand afterGQDs$_{0\text{-}18}$ react with DPPH•. (b) I_D/I_G ratio before and after GQDs$_{0\text{-}18}$ react with DPPH•.

The Raman spectra of GQDs$_{-0}$ to GQDs$_{-18}$ before and after reaction with DPPH• were measured, as shown in **Fig.S5**, to confirm the adduct formation mechanism. Before reaction with DPPH•, the values of I_D/I_G for four GQDs are 0.996 (GQDs$_{-0}$), 0.998 (GQDs$_{-4}$), 1.044 (GQDs$_{-8}$), 0.984 (GQDs$_{-18}$) respectively. After reaction with DPPH• radicals, the values of I_D/I_G are 1.068 (GQDs$_{-0}$), 1.082 (GQDs$_{-4}$), 1.079(GQDs$_{-8}$), 1.052(GQDs$_{-18}$), respectively. The values of I_D/I_G ratio after GQDs reaction with DPPH• radicals are higher than before. This confirms that the grafting of DPPH• on GQDs surface increased defect level of GQDs.

Reference

[1] J. Ge, Y. Li, B. Zhang, N. Ma, J. Wang, C. Pu, Y. Xiang, *J Lumin* 2015, **166**, 322-327.