Supplementary Information

**Fig. S1** (a, c) The scanning electron microscopy (SEM) images of graphene quantum dots rich with carbonyl and carboxylic groups (ox-GQDs) and sulfur doped graphitic carbon nitride (s-g-C\textsubscript{3}N\textsubscript{4}) after hydrothermal treatment at 230 °C for 3h. (b, d) The corresponding transmission electron microscopy (TEM) images of (a) and (c).
Fig. S2 The energy-dispersive spectrometry (EDS) of the as-prepared s-g-C$_3$N$_4$ decorated with GQDs (s-g-C$_3$N$_4$@GQDs).
Fig. S3 Cyclic voltammograms (CV) curves of s-g-C$_3$N$_4$@GQDs, GQDs and s-g-C$_3$N$_4$ with the mass loading of 0.12 mg/cm$^2$ in the electrolyte of 0.1 M phosphate buffered saline (PBS) solution containing 0.1 M KCl. The scan rate is 10 mV/s.
Fig. S4 CV curves of GQDs (a) and s-g-C₃N₄ (b) in an O₂- or N₂-saturated 0.1M KOH solution at a scan rate of 10 mV/s.
**Fig. S5** The linear sweep voltammogram (LSV) curves of the GQDs (a) and s-g-C₃N₄ (b) in O₂-saturated 0.1 M KOH solution at different rotating speeds. The scan rate is 10 mV/s.