Electronic Supplementary Information

Graphene oxide based DNA nanoswitches as a programmable pH-responsive biosensor

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Table S1. Sequences of DNA oligonucleiotide

Name	Sequences（5′-3′）
triplex DNA probe **1** (50% TAT)	AAA AAG GGG GTT TAC CCC CTT TTT CTT TGT TTT TCC CCC- TAMAR
triplex DNA probe **2** (80% TAT)	AAG AAA AGA ATT TAT TCT TTT CTT CTT TGT TCT TTT CTT- TAMAR
Control DNA probe **1**	CAA CAA GAA AGC CAA ACC GAG ATG GGT TTG GCT TTC TTG TTG GTT GAC- TAMAR
Control DNA probe **2**	TGT AGC GAG TGT CTT TGG CA- TAMAR
Control DNA probe **3**	TAMAR- GGT TGG GCG GGA TGG GTG TTT T

Table S2. Fluorescence anisotropy of the DNA probe **1** (50% TAT) in different pH conditions

pH	Anisotropy	Polarization
5.0	0.064665	0.09396
9.0	0.168312	0.232871

Table S3. The water sample **1**, sample **2** and sample **3** respectively from Xiang River, Peach Lake and Yuelu Mountain.

Sample	Proposed method	pH meter
1	6.85±0.12	6.94±0.01
2	6.80±0.08	6.82±0.02
3	7.16±0.15	7.23±0.02

Fig. S1. The CD spectra of DNA probe **1** (50% TAT) on different pH conditions: (a) 4 μM DNA probe, pH 5.0; (b) 4 μM DNA probe, pH 9.0.

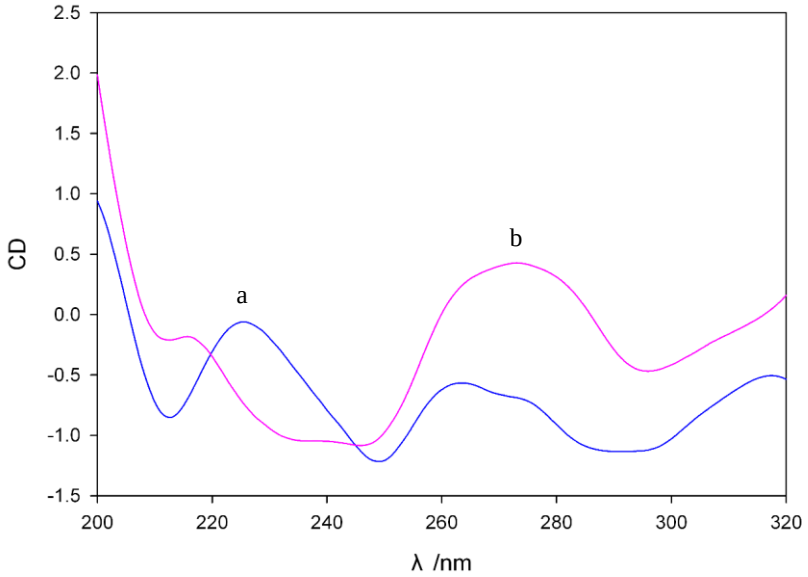

Fig. S2. The fluorescence spectra of different fluorescence probes after adding GO: (a) 100 nM triplex DNA probe **1** + 12 μg/mL GO, pH 5.0; (b) 100 nM control DNA probe **1** + 12 μg/mL GO, pH 5.0; (c) 100 nM control DNA probe **2** + 12 μg/mL GO, pH 5.0; (d) 100 nM control DNA probe **3** + 12 μg/mL GO, pH 5.0.

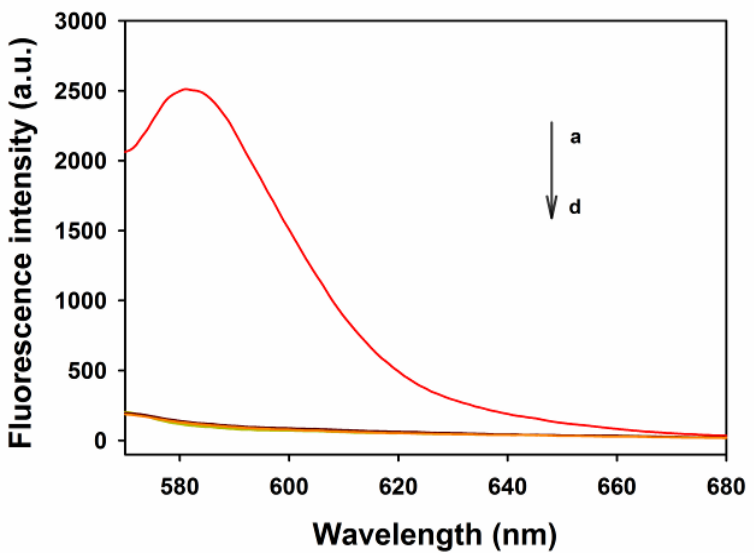

Fig. S3. The ratio of fluorescence signal of the DNA probe **1** in different concentrations of GO. F and F_0 were the fluorescence values at pH 5.0 and 9.0, respectively. Error bars were standard deviations of three repetitive experiments.

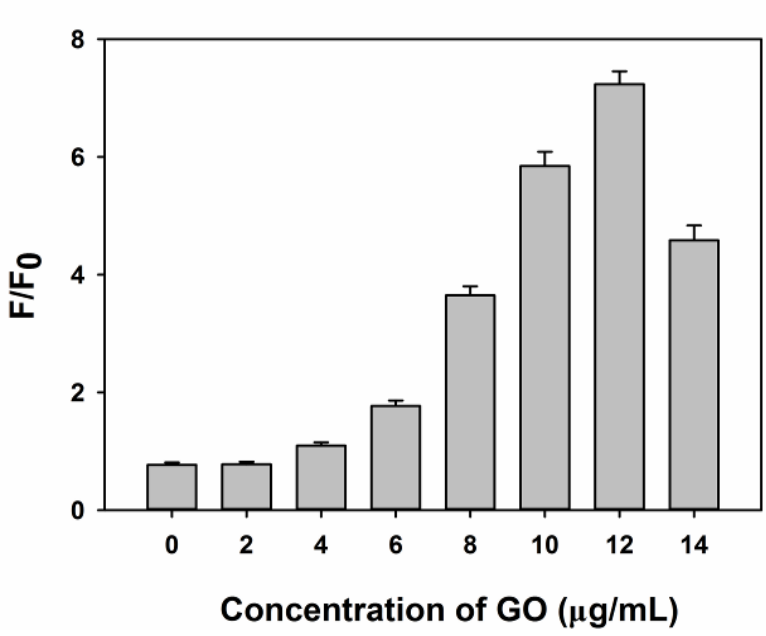

Fig. S4. The fluorescence quenching rate of GO (50% TAT): (a) 100 nM DNA + 12 μg/mL GO, pH 5.0; (b) 100 nM DNA + 12 μg/mL GO, pH 6.0; (c) 100 nM DNA + 12 μg/mL GO, pH 7.0; (c) 100 nM DNA + 12 μg/mL GO, pH 8.0; (d) 100 nM DNA + 12 μg/mL GO, pH 9.0.