

Electronic Supplementary Information (ESI)

Platinum nanoparticles on reduced graphene oxide as peroxidase mimetics for colorimetric detection of specific DNA sequence

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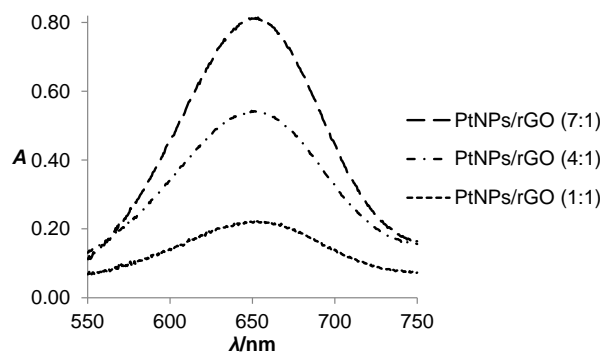


Fig. S1 Visible absorption spectra of the oxidized TMB solution for PtNPs/rGO of different mass ratios (1:1, 4:1, and 7:1). The concentrations of TMB, H_2O_2 , and PtNPs/rGO were 0.83 mM, 20 mM, and 50 ng mL^{-1} , respectively. The spectra were measured at 10 min after the mixing of all components.

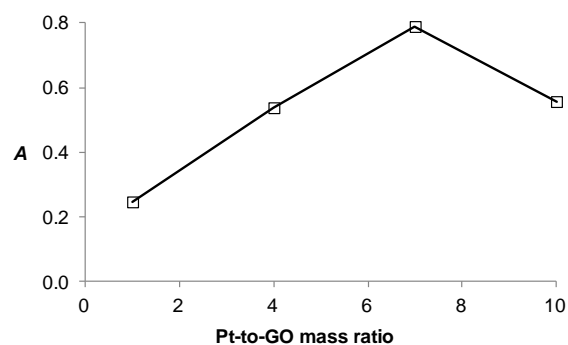


Fig. S2 Comparison of the peroxidase-like activity of PtNPs/rGO of different mass ratios (1:1, 4:1, 7:1, and 10:1). The concentrations of TMB, H_2O_2 , and PtNPs/rGO were 0.83 mM, 20 mM, and 50 ng mL^{-1} , respectively. The absorbance at 652 nm was taken at 10 min after the mixing of all components.

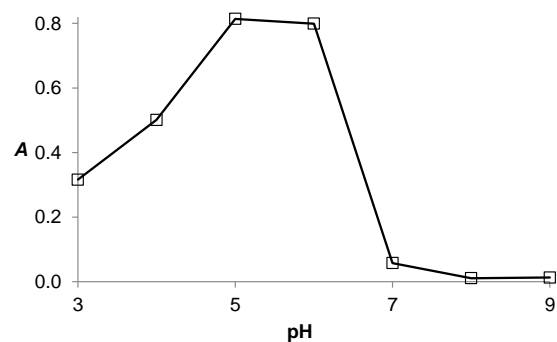


Fig. S3 The effect of pH on the peroxidase-like activity of PtNPs/rGO (mass ratio of 7:1). The concentrations of TMB, H_2O_2 , and PtNPs/rGO were 0.83 mM, 20 mM, and 50 ng mL^{-1} , respectively. The absorbance at 652 nm was taken at 10 min after the mixing of all components.

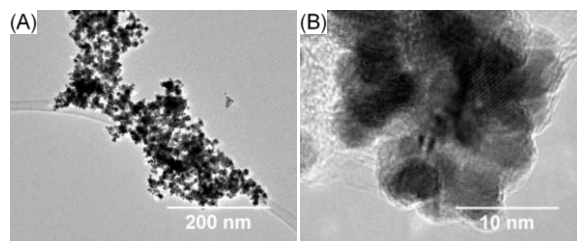


Fig. S4 Transmission electron microscopy (TEM) photographs of PtNPs/rGO of 10:1 mass ratio at (A) low and (B) high magnification.

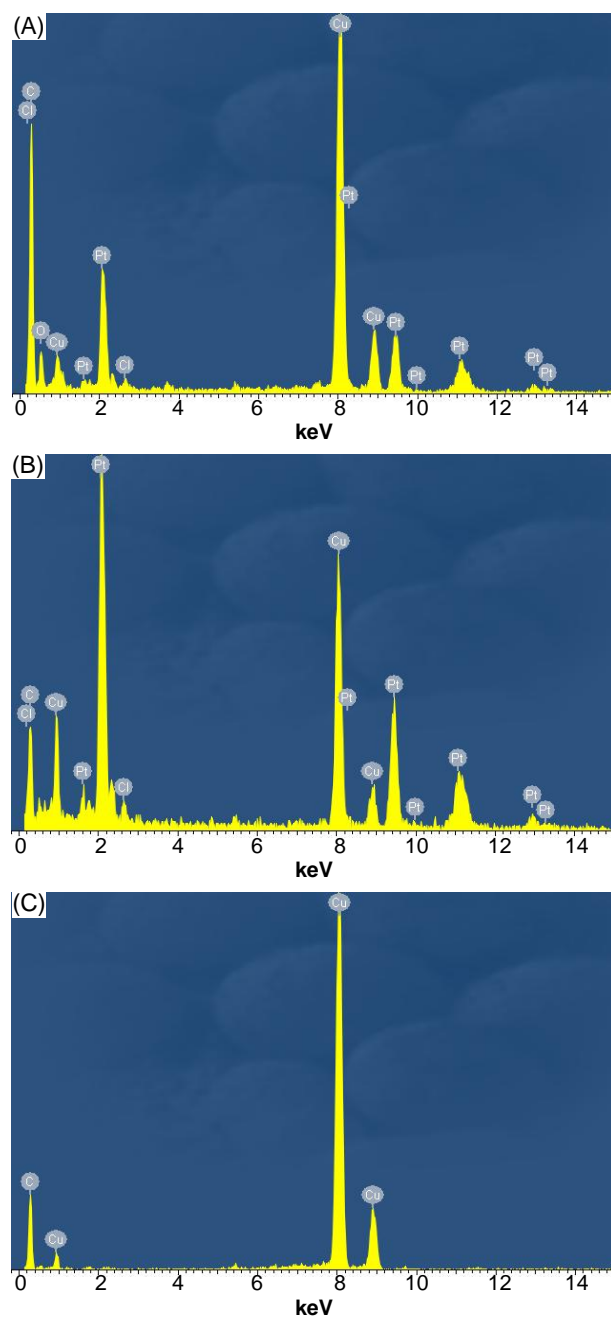


Fig. S5 Energy-dispersive X-ray spectroscopy (EDS) patterns of (A) PtNPs/rGO of 7:1 mass ratio, (B) PtNPs, and (C) background signal from the supporting TEM grid.

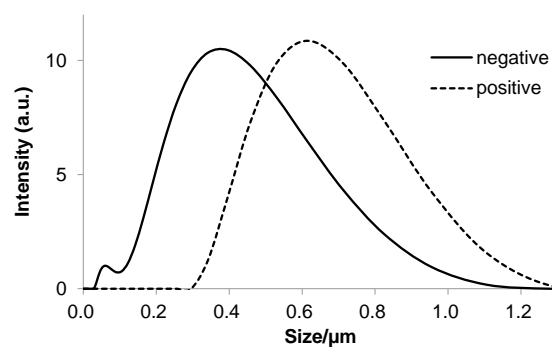


Fig. S6 Dynamic light scattering (DLS) analysis of PtNPs/rGO (mass ratio of 7:1) after 1 h incubation with negative (without target) or positive (with target) PCR product in 50 mM NaCl. The concentration of the PtNPs/rGO was $1 \mu\text{g mL}^{-1}$ and the PCR product was diluted by 80-fold.

Table S1 Comparison of the kinetic parameters of the PtNPs/rGO developed in this work with horseradish peroxidase (HRP) and some other previously reported nanomaterial-based enzyme mimetics. $[E_t]$ is the total concentration (free and bound states) of the enzyme mimetics or HRP, K_M is the Michaelis constant, and V_{max} is the maximal velocity.

	$[E_t]/\mu\text{g mL}^{-1}$	TMB as substrate		H_2O_2 as substrate	
		K_M/mM	$V_{max}/10^{-8} \text{ M s}^{-1}$	K_M/mM	$V_{max}/10^{-8} \text{ M s}^{-1}$
PtNPs/rGO ^a	0.05 ^b	0.0806	46.5	935	378
HRP (Ref. 1)	0.001	0.434	10.0	3.70	8.71
Fe_3O_4 MNPs (Ref. 1)	40	0.098	3.44	154	9.78
GO (Ref. 13)	40	0.0237	3.45	3.99	3.85
PtNPs (Ref. 15)	0.03	0.120	126	769	185
PtNPs (Ref. 24)	10	3.417	400	-	-
PtNPs/rGO (Ref. 24)	50	0.619	127	-	-
MNPs–PtNPs/rGO (Ref. 24)	50	0.519	213	-	-
PtNPs/GO (Ref. 25)	-	0.186	10.2	221	12.5

^a The mass ratio of PtNPs/rGO was 7:1. The apparent kinetic parameters with TMB as substrate were calculated from the data in Fig. 4B (TMB concentration from 10 μM to 0.1 mM) and those with H_2O_2 as substrate were calculated from the data in Fig 4C.

^b This concentration did not account for the mass of the PtNPs. If included, the concentration was 0.22 $\mu\text{g mL}^{-1}$.