

Ultratrace Naked-eye Colorimetric Detection of Hg^{2+} in Wastewater and Serum Utilizing Mercury-stimulated Peroxidase Mimetic Activity of Reduced Graphene Oxide-PEI-Pd Nanohybrids

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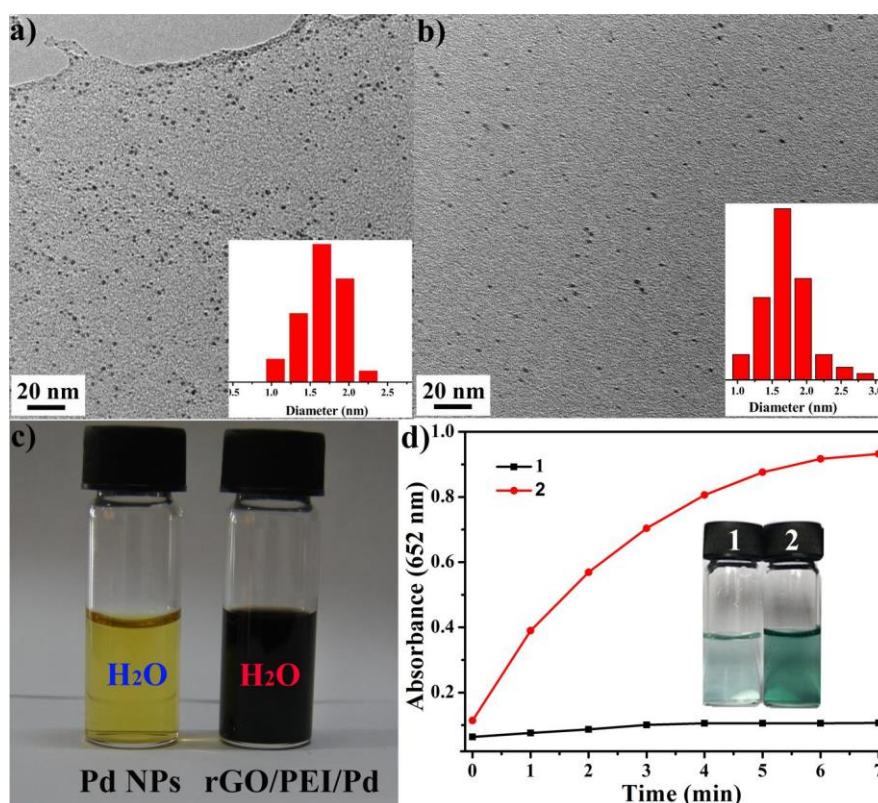


Figure S1 (a) TEM images of rGO/PEI/Pd nanohybrids, inset: the nanoparticle size distribution of Pd NPs at rGO sheets. (b) TEM images of as-prepared 1.6~1.7 nm of the free Pd NPs, inset: the nanoparticle size distribution of Pd NPs at copper grid. (c) Photographs of Pd NPs and rGO/PEI/Pd nanohybrids in ddH₂O. (d) Mercury-stimulated peroxidase mimetic activity of the free Pd NPs (black curve) and rGO/PEI/Pd nanohybrids (red curve). Under the optimal conditions, the concentration of Pd NPs is equal (black curve) with the of rGO/PEI/Pd nanohybrids. inset: Photographs of the mercury-stimulated peroxides mimetic activity of the free Pd NPs and rGO/PEI/Pd nanohybrids.

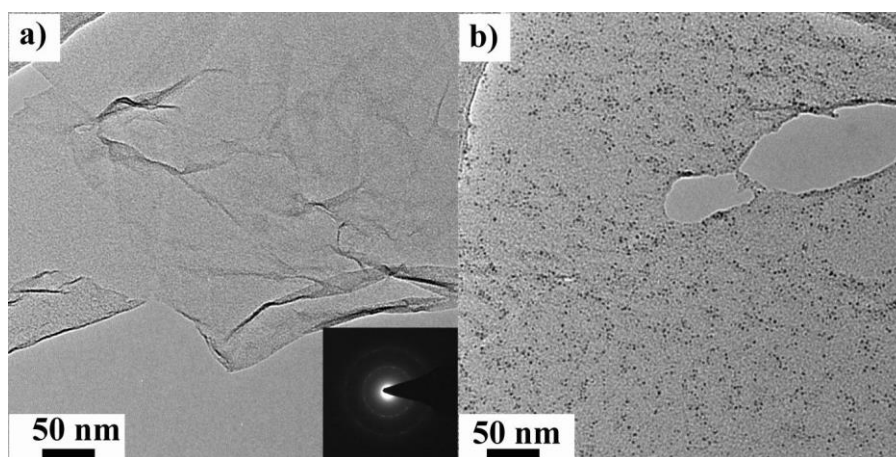


Figure S2. (a) TEM image of GO hybrid and SAED pattern of GO nanosheets. (b) TEM image of rGO/PEI/Pd nanohybrids.

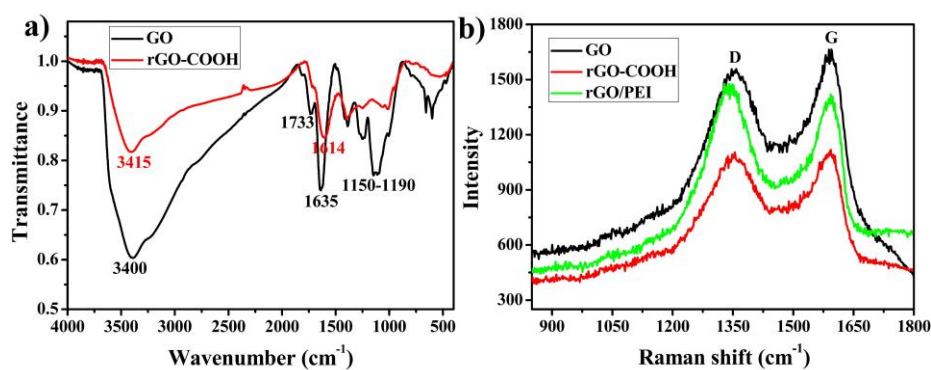


Figure S3. (a) Fourier transform infrared (FTIR) spectrum of GO and rGO-COOH. (b) Raman spectra of GO, rGO-COOH and rGO/PEI.

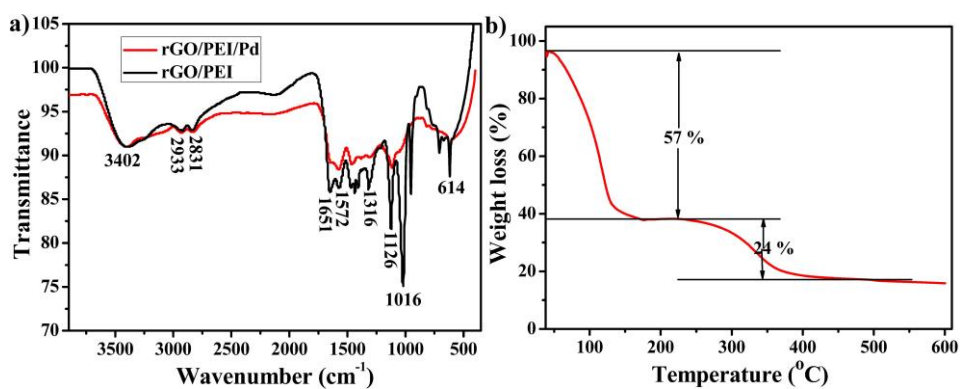


Figure S4. (a) Fourier transform infrared (FTIR) spectrum of rGO/PEI and rGO/PEI/Pd nanohybrids. (b) TG-DTA spectra of rGO/PEI.

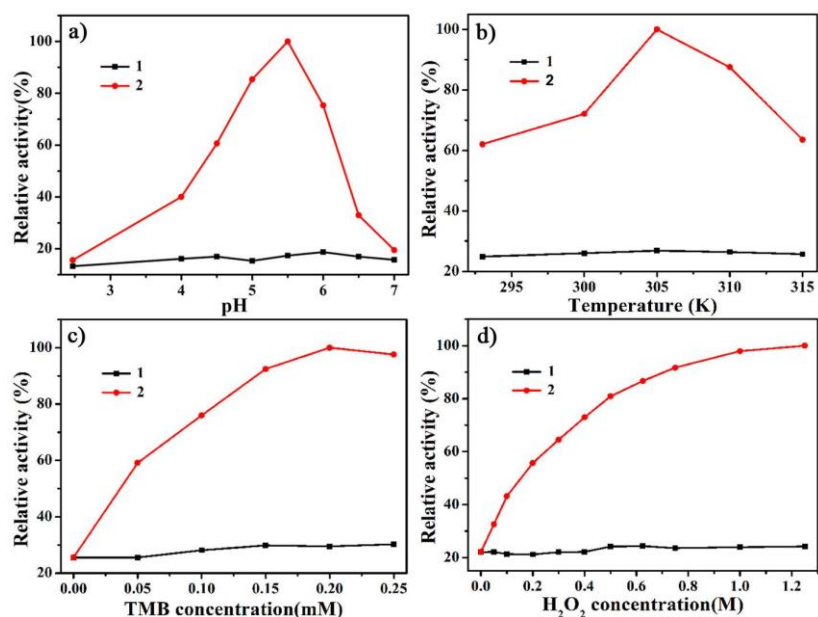


Figure S5. The mercury-stimulated peroxides-like catalytic activity of rGO/PEI/Pd nanohybrids is dependent on temperature (a), pH (b), TMB concentration (c) and H_2O_2 concentration (d) in the absence (1) and presence (2) of Hg^{2+} . Experiments were carried out using 0.20 mM TMB, 0.50 M H_2O_2 , 10 μM Hg^{2+} with the same amounts of the rGO/PEI/Pd nanohybrids (20 nM Pd NPs) in citric acid–disodium hydrogen phosphate buffer.

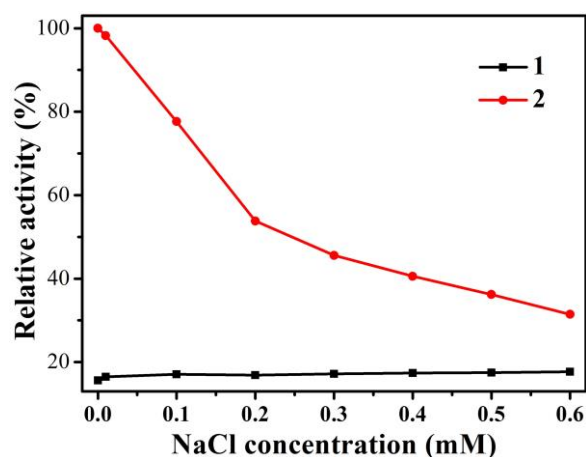


Figure S6. The mercury-stimulated peroxidase-like activity of the rGO/PEI/Pd nanohybrids in the presence of NaCl at various concentrations in the absence (1) and presence (2) of Hg^{2+} . Experiments were carried out using 0.20 mM TMB, 0.50 M H_2O_2 in citric acid–phosphate buffer (25 mM pH 5.5) at 305 K.

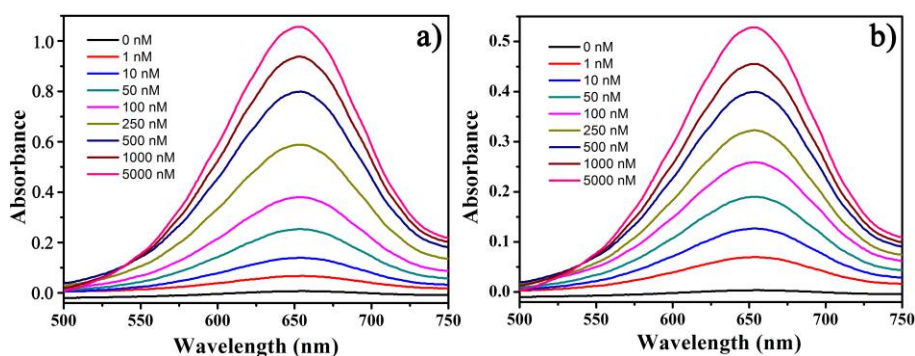


Figure S7. UV-Vis spectra for wastewater (a) and human serum (b) samples spiked with different concentrations of Hg^{2+} (from 1 nM to 5 μ M). Experiments were carried out using 0.20 mM TMB, 0.50 M H_2O_2 in citric acid–phosphate buffer (25 mM pH 5.5) at 305 K, incubation time, 5 min.

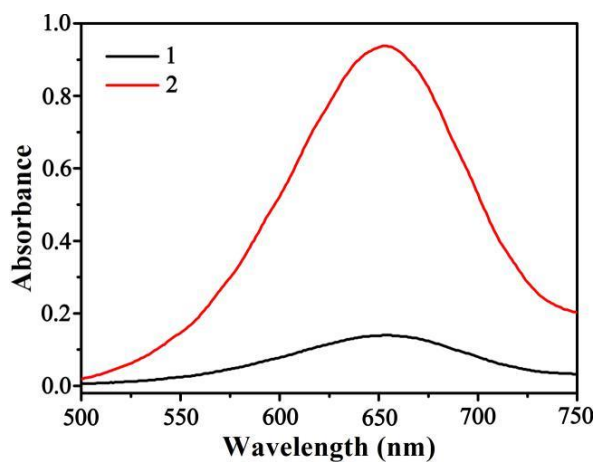


Figure S8. The absorbance profiles for the mercury-stimulated peroxides mimetic activity of the mixed Pd NPs+ GO + PEI (black line) and rGO/PEI/Pd nanohybrids (red line). Experiments were carried out using 0.20 mM TMB, 0.50 M H_2O_2 in citric acid–phosphate buffer (25 mM pH 5.5) at 305 K, incubation time, 5 min.

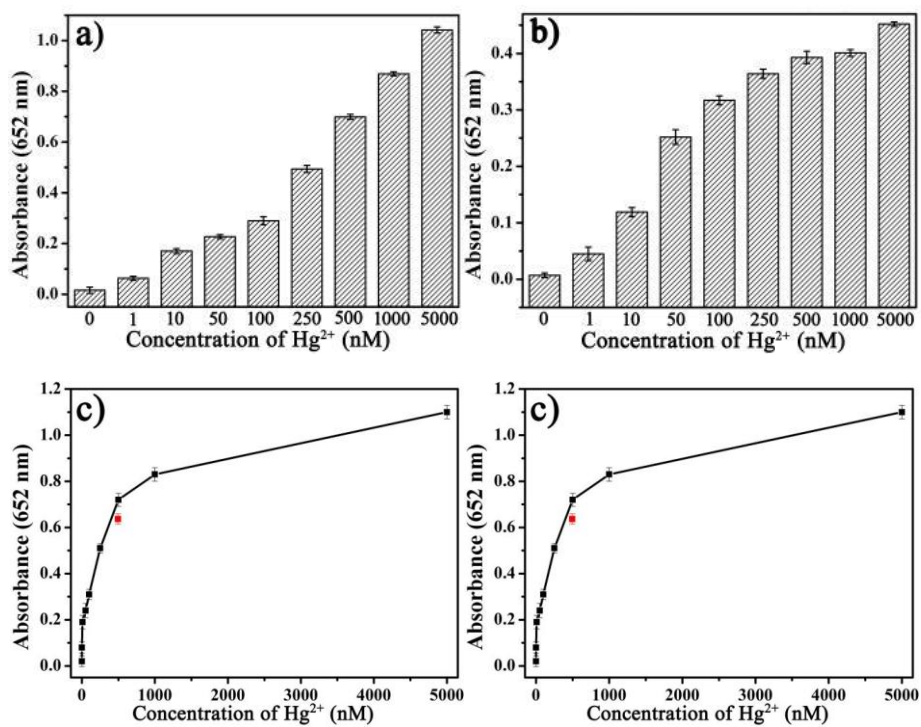


Figure S9. Responses of wastewater (a,c) and human serum (b,d) spiked with different concentration of Hg^{2+} by UV-vis detection. Red Square is the standard sample experimental data.