Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Morphology-Tunable Ultrafine Metal Oxide Nanostructures Uniformly Grown on Graphene and Their Applications in Photo-Fenton System

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The synthesis of TiO_2 QDs on graphene

For synthesis of ultrafine TiO_2 grown on graphene, 8 mL of 0.2 M Titanium (IV) oxysulfate aqueous solution and 0.3 g urea were added into 30 mL of GO aqueous solution and sonicated for 0.5 h. Then 40 mL of glycerol was added in the mixture and stirred for 0.5 h at room temperature. The above suspensions were transferred into a Teflon-lined autoclave, which was sealed and maintained at 180 °C for 18 h. The obtained precipitate was collected by centrifugation and washed with absolute ethanol and deionized water for several times. Finally, the synthesized sample was dried in an oven at 60 °C overnight.

The synthesis of Fe_3O_4 QDs on graphene

For synthesis of ultrafine Fe_3O_4 grown on graphene, 5 mL of 0.2 M $FeCl_3$ aqueous solution and 0.3 g urea were added into 30 mL of GO aqueous solution and sonicated for 0.5 h. Then 40 mL of glycerol was added in the mixture and stirred for 0.5 h at room temperature. The above suspensions were transferred into a Teflon-lined autoclave, which was sealed and maintained at 180 °C for 18 h. The obtained precipitate was collected by centrifugation and washed with absolute ethanol and deionized water for several times. Finally, the synthesized sample was dried in an oven at 60 °C overnight.

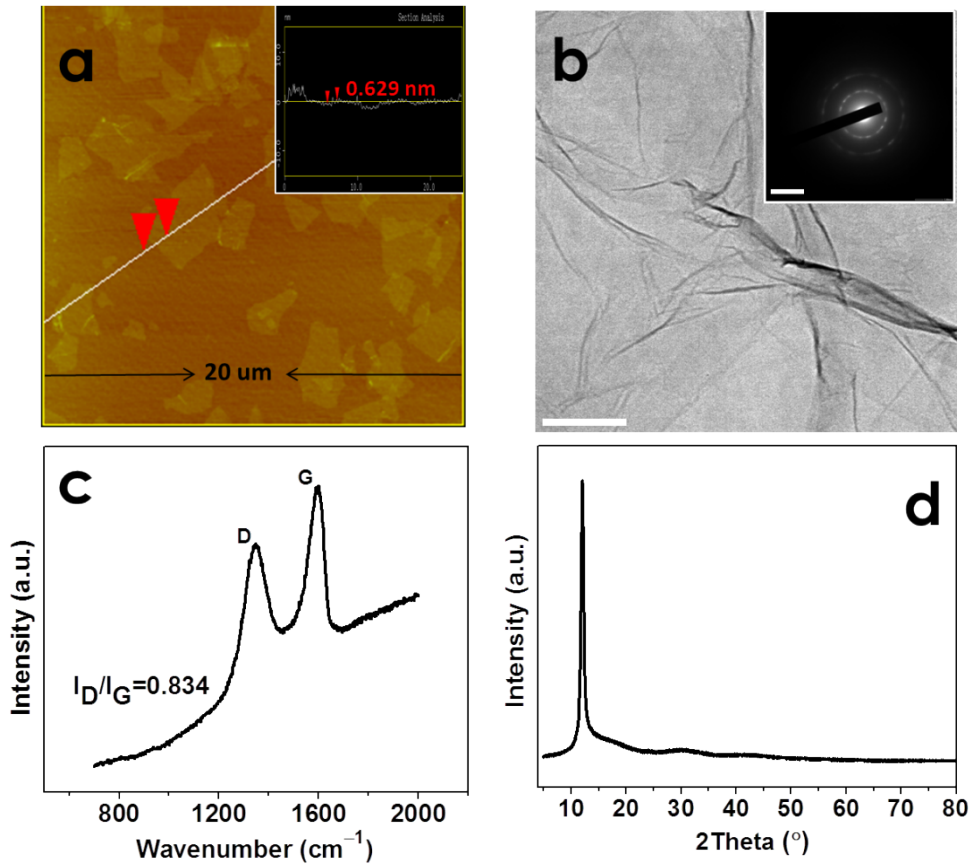

Figure S1. a) AFM image of GO and the height cross-sectional profile (inset a). b) TEM image of GO and the selected area electron diffraction pattern (inset b). Scale bars: 100 nm for b, 5 nm for inset b. c) Raman spectrum of GO. d) XRD pattern of GO.

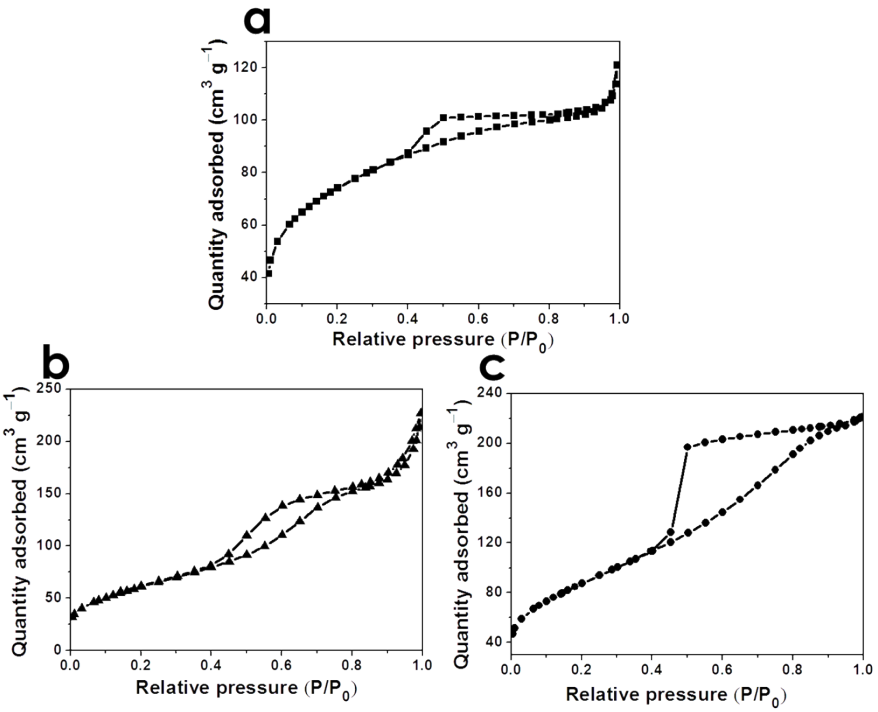

Figure S2. N_2 adsorption-desorption isotherms of a) QDs-Fe/G, b) NRs-Fe/G, and c) NSs-Fe/G.

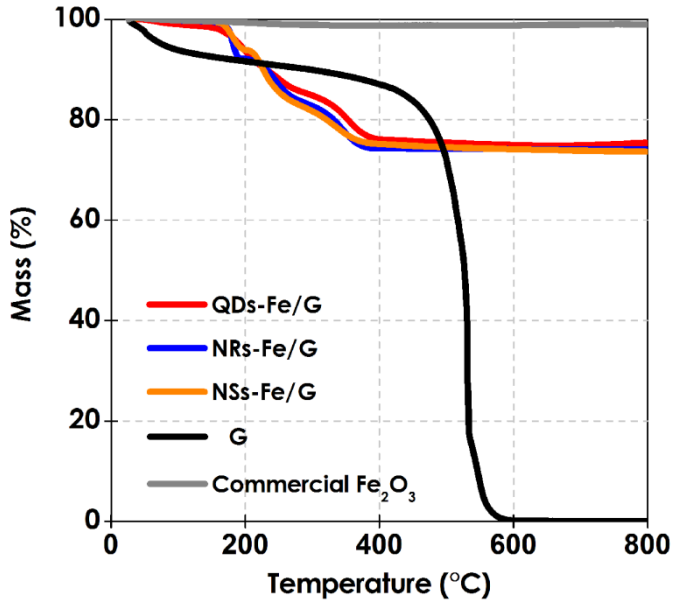

Figure S3. TGA curves of the samples.

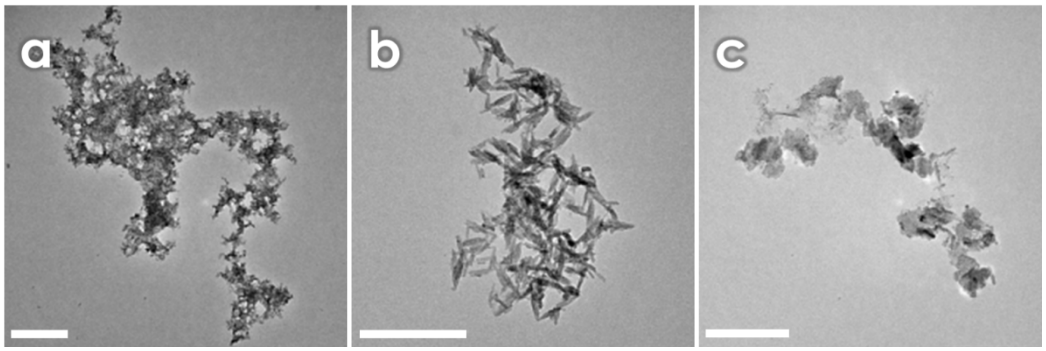

Figure S4. TEM images of as-synthesized samples with different dosage of glycerol in absence of GO: a) 30 mL, b) 5 mL, and c) 12 mL. Scale bar: 100 nm.

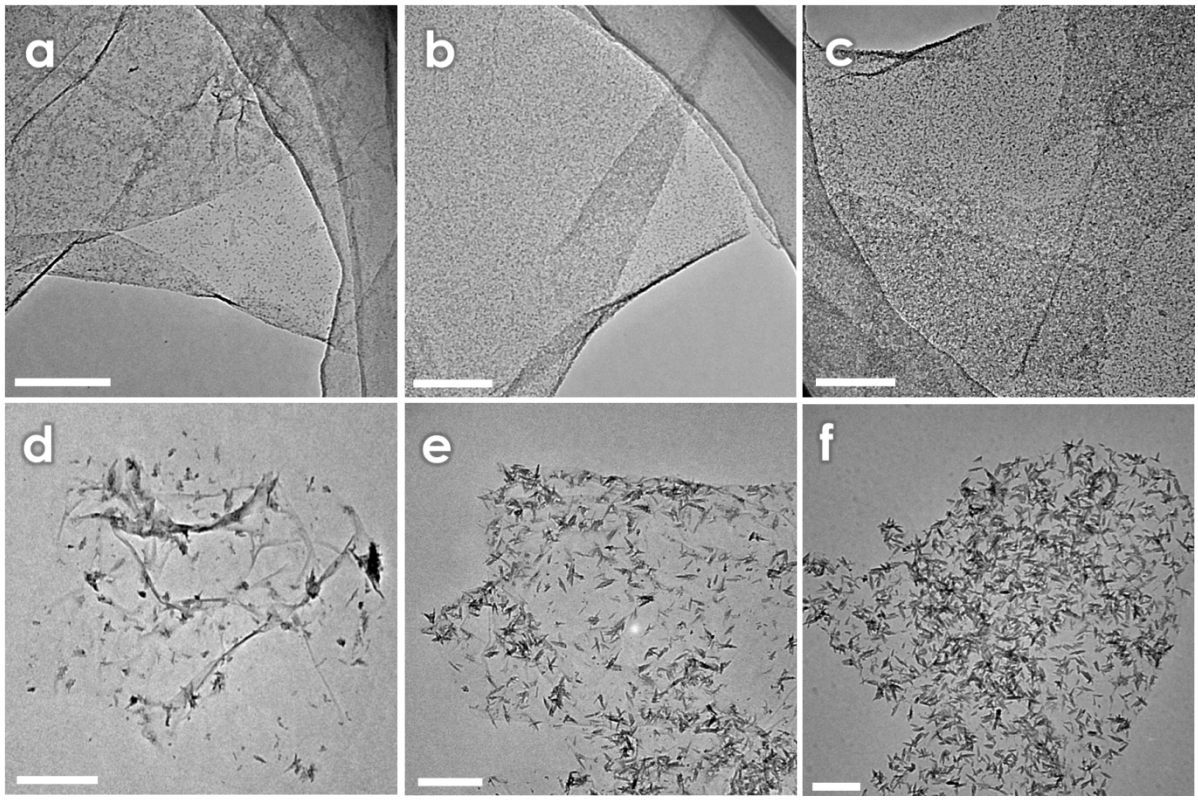

Figure S5. TEM images of a-c) QDs-Fe/G and d-f) NRs-Fe/G with different dosage of Fe^{3+}. 1 mL for a) and d); 3 mL for b) and e); 5 mL for c) and f). Scale bar: 200 nm.

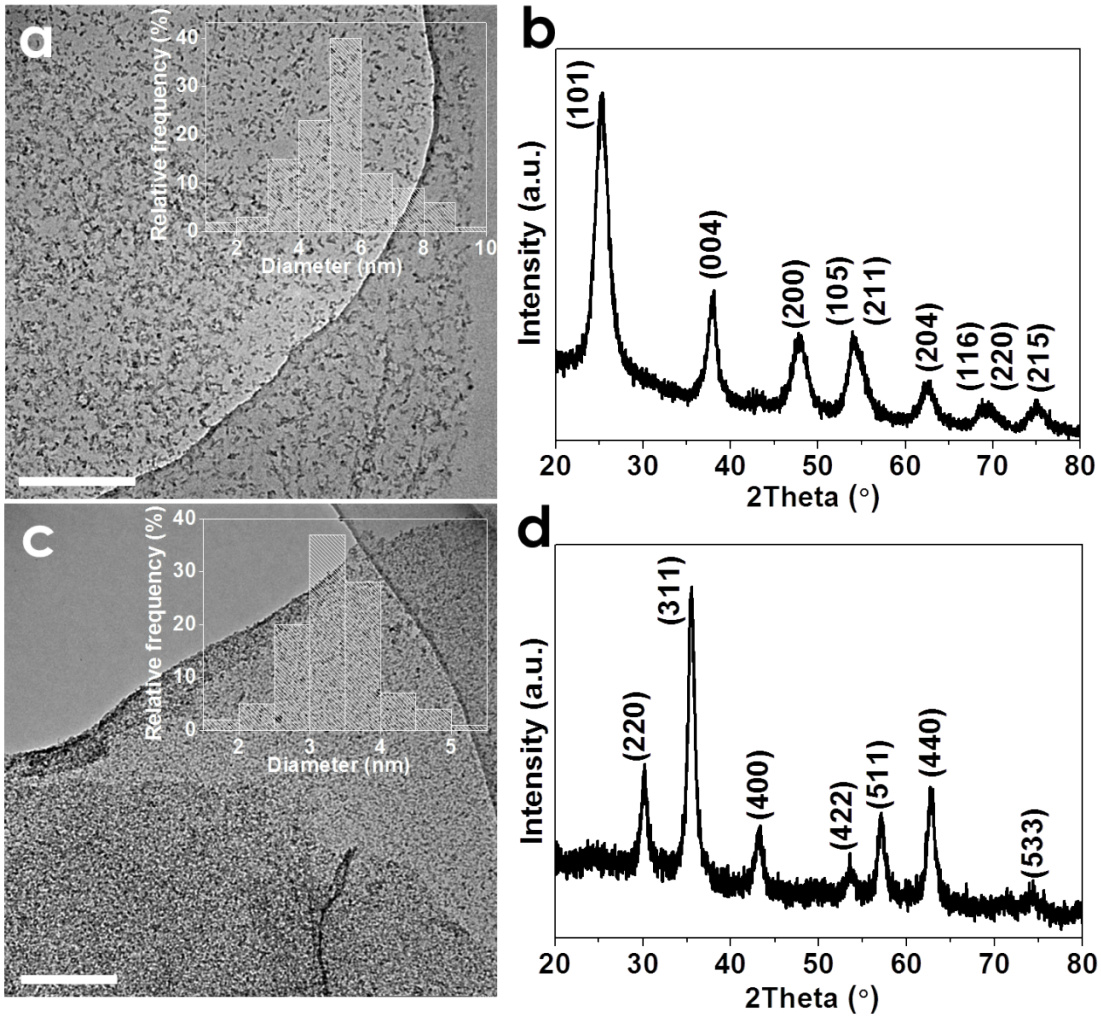

Figure S6. TEM images of a) TiO_2 and c) Fe_3O_4 QDs grown on graphene. The inset a and c display the histograms showing particle size of TiO_2 and Fe_3O_4, respectively. Scale bar: 200 nm. XRD patterns of b) TiO_2 QDs/G and d) Fe_3O_4 QDs/G.

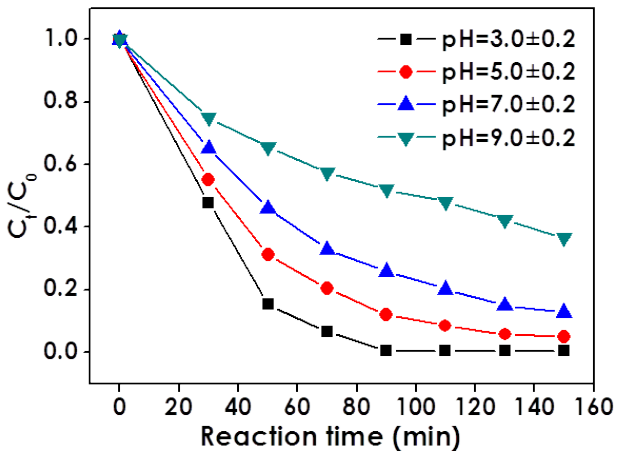

Figure S7. Effect of pH on the RhB degradation for QDs-Fe/G.

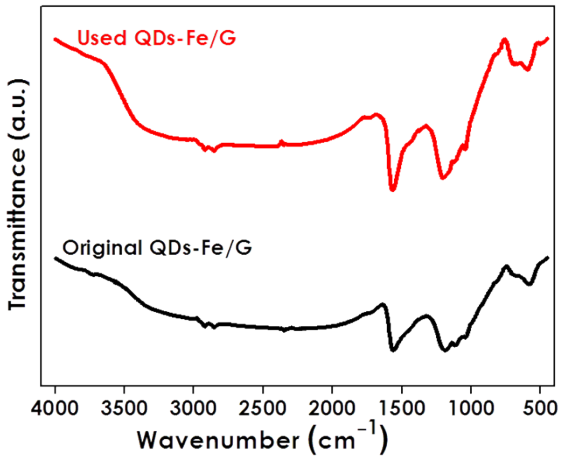

Figure S8. The FTIR spectra of the orginal QDs-Fe/G and the used QDs-Fe/G.

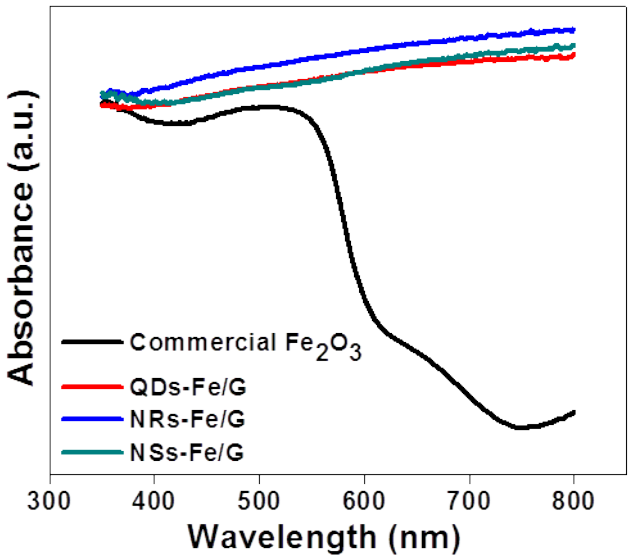

Figure S9. Diffuse reflectance UV-Vis spectra of different samples.

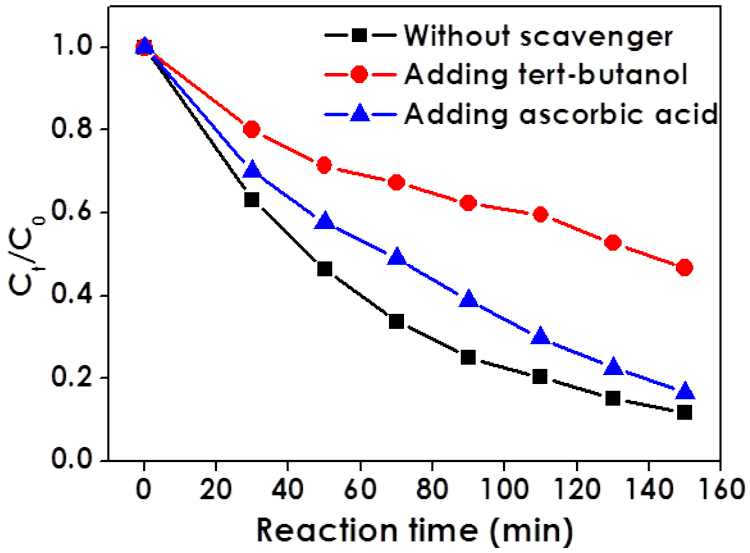

Figure S10. Photo-Fenton efficiencies of QDs-Fe/G in the degradation of RhB under different conditions: without scavenger, adding tert-butanol, or ascorbic acid.

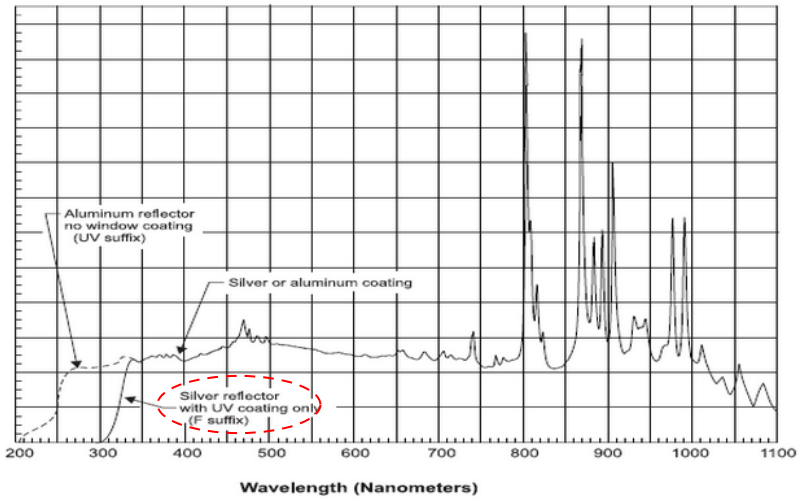

Figure S11. The wavelength distribution of short-arc xenon lamp (marked with red dotted line, Perkin-Elmer, PE300BF) provided by the Beijing NBeT corporation.

Table S1. The iron leaching from QDs-Fe/G under different value of pH.

Values of pH	3±0.2	5±0.2	7±0.2	9±0.2
Amounts of iron leaching (mg/L)	19.80	0.341	0.001	0.001