Choline Sensing Based on In Situ Polymerization of Aniline on the Surface of Upconverting Nanoparticles

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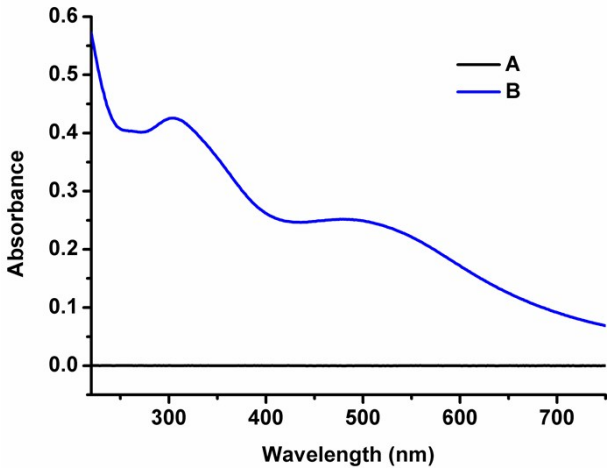

Fig. S1. UV-vis absorption spectra of the UCNPs before (A) and after (B) the in situ polymerization of aniline. Conditions: 100 mM Na_3PO_4 buffer (pH 3.0), 0.1 mg/mL UCNPs, 2 mM aniline, 0.05 mg/mL HRP, 1 mM H_2O_2, excitation at 980 nm.

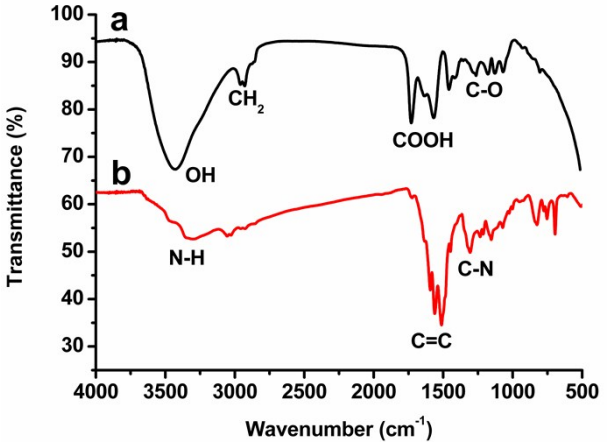

Fig. S2. The FTIR spectra of the UCNPs before (a) and after (b) the polymerization of aniline. Conditions: 100 mM Na_3PO_4 buffer (pH 3.0), 0.1 mg/mL UCNPs, 2 mM aniline, 0.05 mg/mL HRP, 1 mM H_2O_2, excitation at 980 nm.

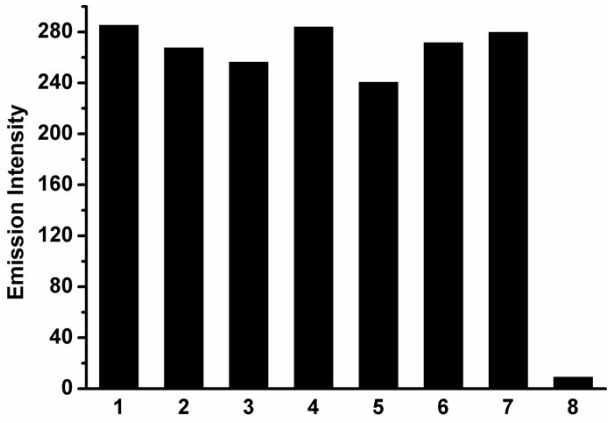

Fig. S3. Upconversion luminescence intensity changes (at 541 nm) of 0.1 mg/mL UCNPs in the presence of: 1) UCNPs only, 2) UCNPs + aniline, 3) UCNPs + H_2O_2, 4) UCNPs + HRP, 5) UCNPs + H_2O_2 + aniline, 6) UCNPs + H_2O_2 + HRP, 7) UCNPs + aniline + HRP, 8) UCNPs + H_2O_2 + aniline + HRP. Conditions: 2 mM aniline, 0.05 mg/mL HRP, 1 mM H_2O_2.

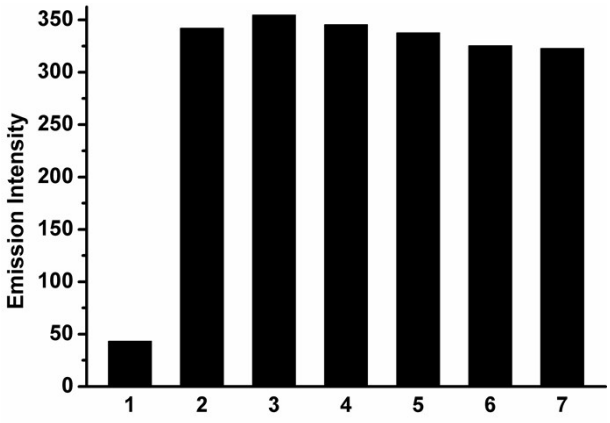

Fig. S4. Selectivity study. Upconversion luminescence intensity (at 541 nm) of the UCNPs in the presence of 200 μM ions or proteins. From 1 to 7: choline, human serum albumin, alkaline phosphatase, Na^+, K^+, Ca^{2+} and Mg^{2+}. Conditions: 100 mU choline oxidase, enzymatic reaction time: 60 min, 100 mM Na_3PO_4 buffer (pH 3.0), 0.1 mg/mL UCNPs, 2 mM aniline, 0.05 mg/mL HRP.