

Supporting Information

Upconversion fluorescent nanoprobe based on 4-NP reversible structure for a wide range of pH determination

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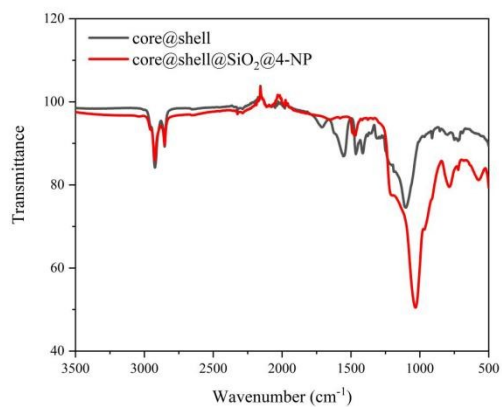


Fig. S1 FT-IR spectra of core@shell and core@shell@SiO₂@4-NP nanocrystals

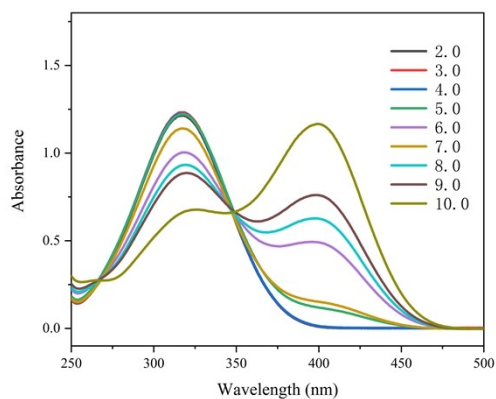


Fig. S2 UV-visible absorption spectra of 4-NP (50 μM) at different pH conditions.

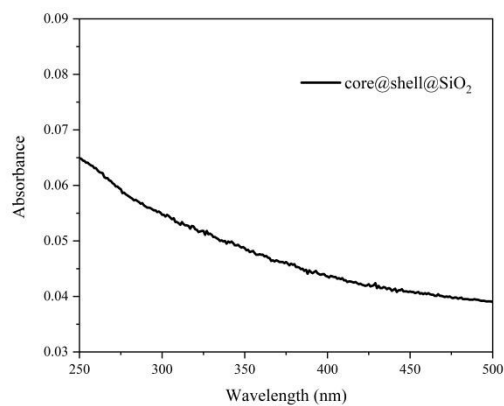


Fig. S3 UV-visible absorption spectra of core@shell@SiO₂

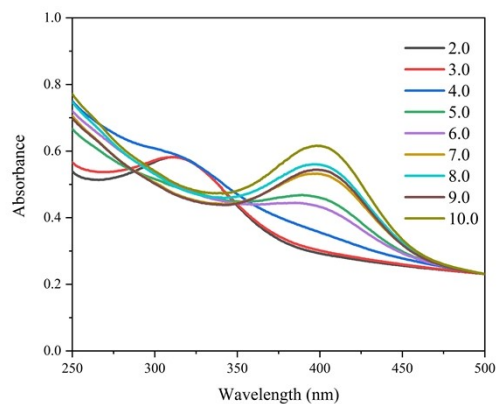


Fig. S4 UV-visible absorption spectra of 4-NP (50 μM) at different pH conditions.

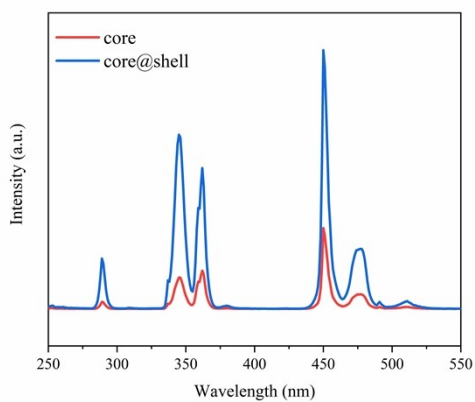


Fig. S5 Upconversion fluorescence spectra of core and core@shell nanomaterials under 980 nm excitation.

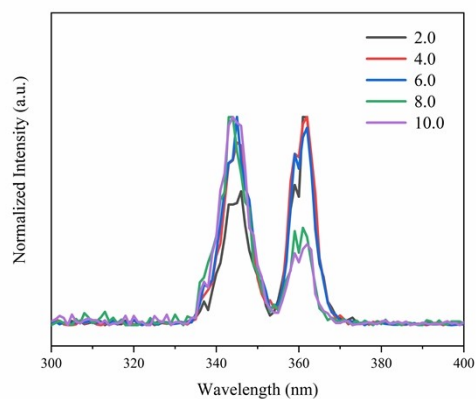


Fig. S6 Normalized upconversion fluorescence emission spectra of core@shell@SiO₂@4-NP in different pH under 980 nm excitation with the same power.

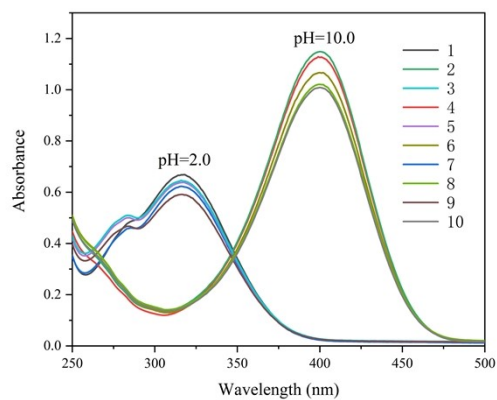


Fig. S7 UV-vis absorption spectra of the reversibility of 4-NP solution in alkaline and acidic solutions (at pH= 2.0, pH= 10.0).