Supplementary Information for

Ratiometric detection of Zn^{2+} and Cd^{2+} based on self-assembled nanoarchitectures with dual emissions involving aggregation enhanced emission (AEE) and its application

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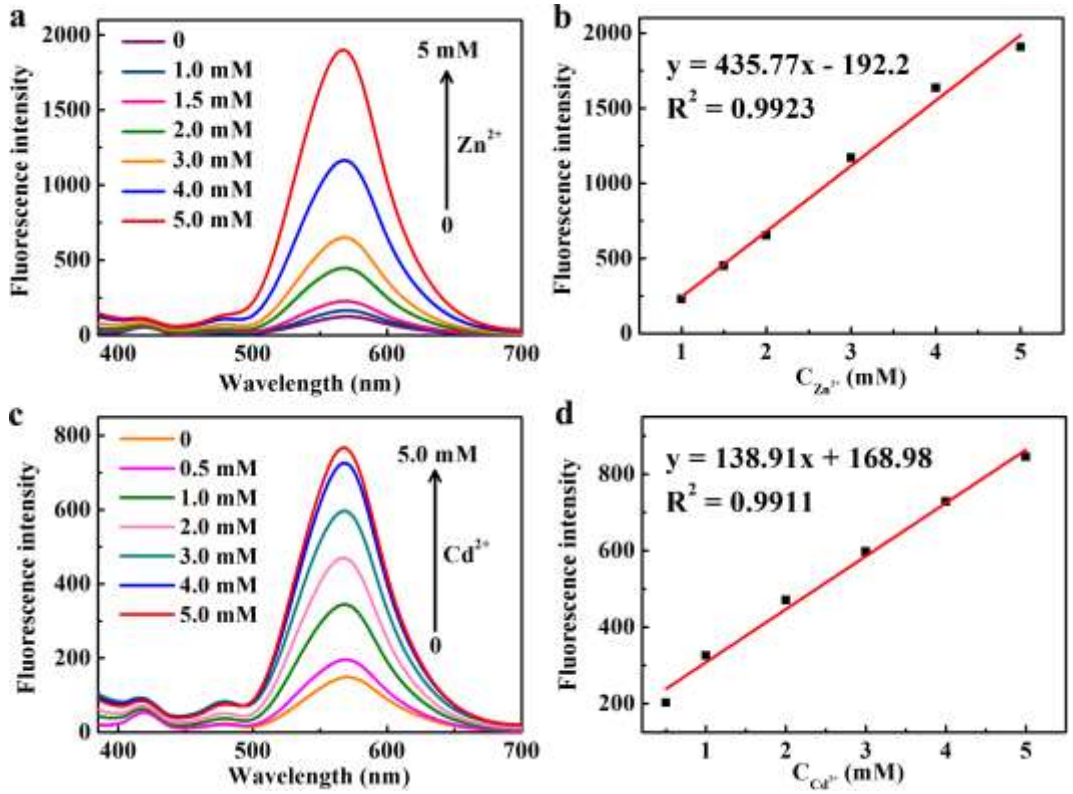

Fig. S1 Fluorescence spectra of free GSH-AuNCs in the absence and presence of the different concentrations of the Zn^{2+} and Cd^{2+} (a, c). Corresponding linear ranges from 1 to 5 mM of Zn^{2+} and 0.5 to 5 mM of Cd^{2+} (b, d).

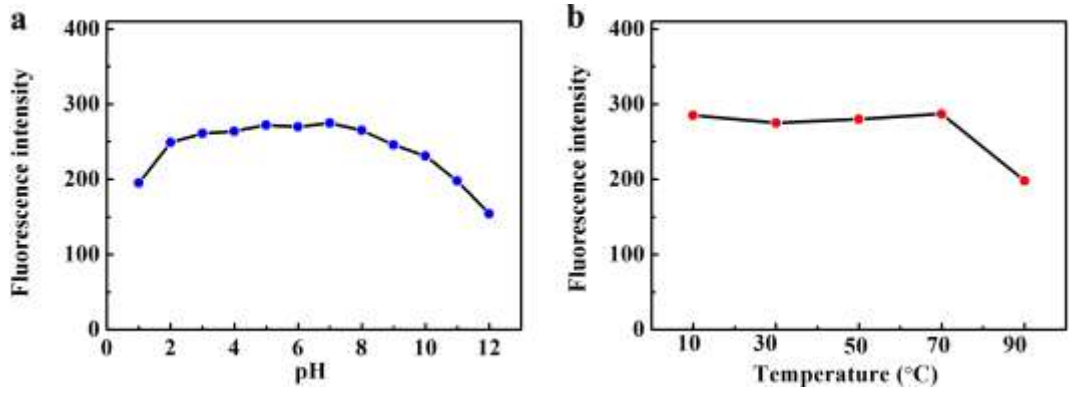

Fig. S2 Influences of pH and temperature on the fluorescence intensity of free GSH-AuNCs (130 μg/mL).

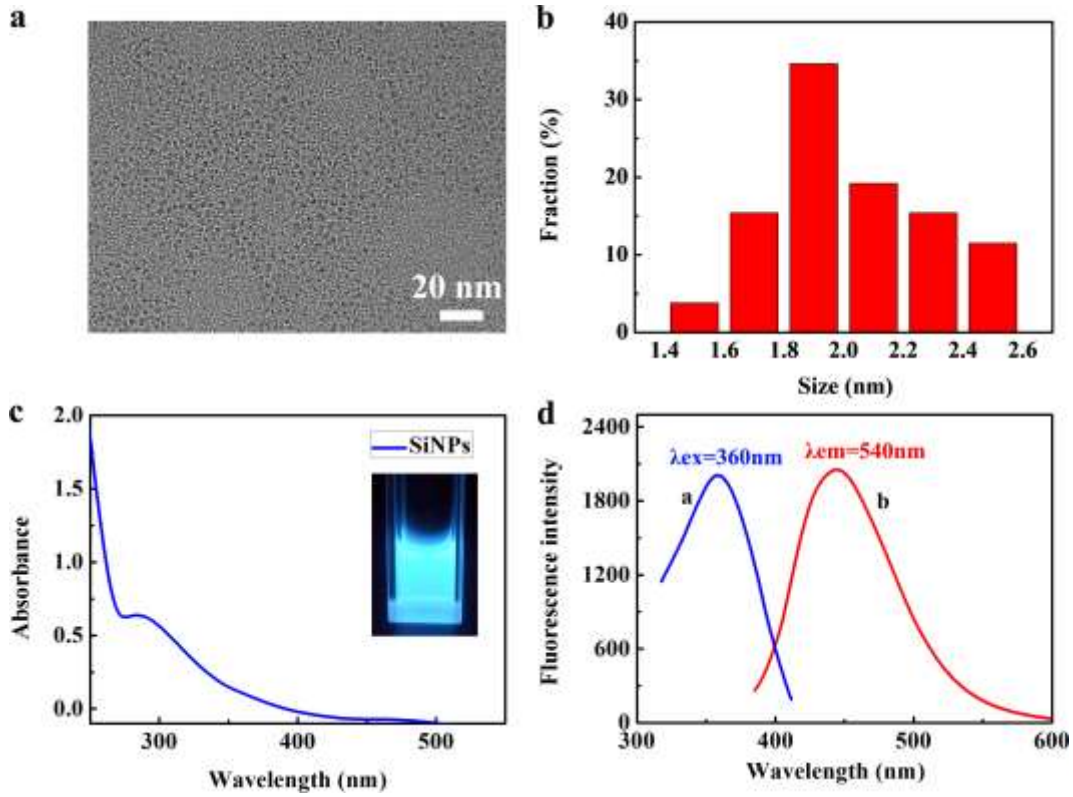

Fig. S3 TEM image (a), size distribution (b), UV-vis absorption spectrum (c), and excitation and emission spectra of SiNPs (d). The inset of (c) is photograph of SiNPs solution under UV light at 365 nm.

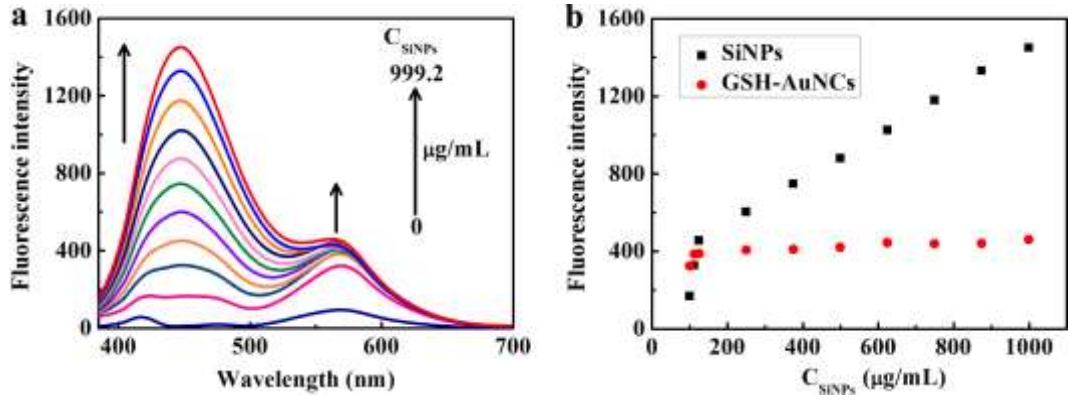

Fig. S4 Fluorescence spectra of GSH-AuNCs in the absence and presence of the different concentrations of the SiNPs (a) and corresponding fluorescence intensity variations of SiNPs and GSH-AuNCs (b). The concentration of GSH-AuNCs is 26 μg/mL and the concentrations of SiNPs are 0, 99.92, 112.4, 124.9, 249.8, 374.7, 499.6, 624.5, 749.4, 874.3 and 999.2 μg/mL from bottom to top in (a), respectively.

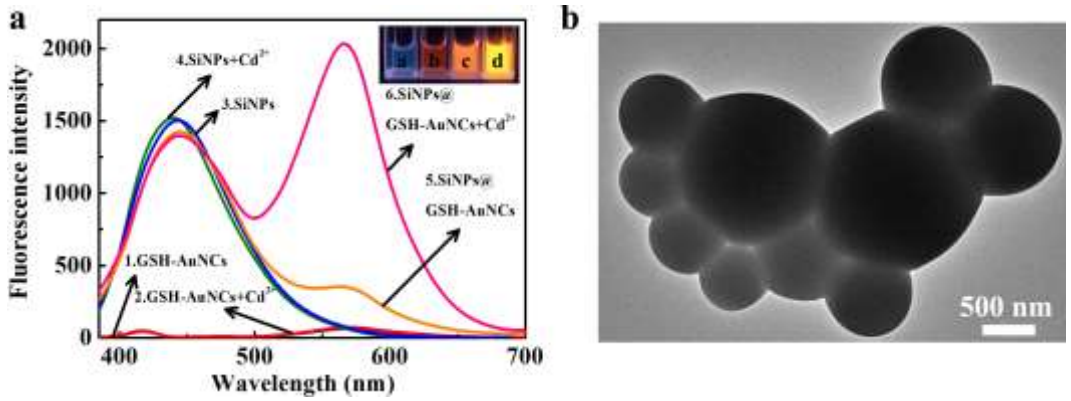

Fig. S5 Fluorescence spectra of GSH-AuNCs, SiNPs, and SiNPs@GSH-AuNCs in the absence (curve 1, 3, 5) and presence of Cd^{2+} (curve 2, 4, 6), respectively (a), and TEM image of SiNPs@GSH-AuNCs in the presence of Cd^{2+} (b). The inset of (a) is the photographs of the corresponding solutions under the UV lamp (a: SiNPs; b: GSH-AuNCs; c: SiNPs@GSH-AuNCs; d: SiNPs@GSH-AuNCs+Cd^{2+}). The concentration of Cd^{2+} is 150 μM.

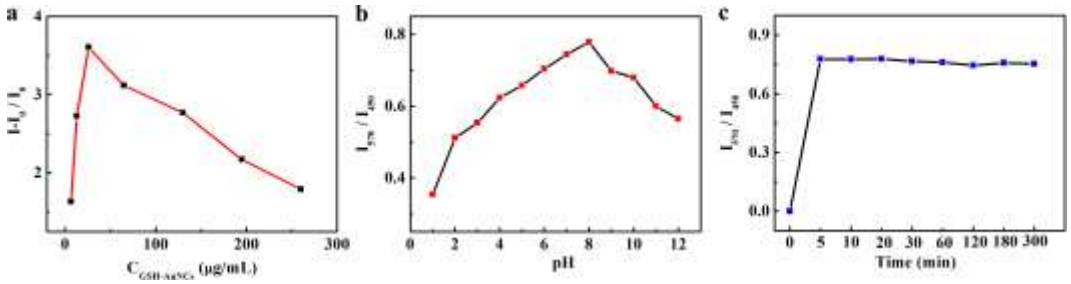

Fig. S6 Effects of probe concentration (a), pH value (b) and incubation time (c) on the fluorescence responses of SiNPs@GSH-AuNCs on Zn^{2+} detection. The concentration of Zn^{2+} is 50 μM.

To optimize the probe concentration, the different concentrations of GSH-AuNCs were separately added into the aqueous solutions, and then 5 μL SiNPs (124 mg/mL) and 50 μM of Zn^{2+} were injected into the above solutions (the total volume is 1 mL). In Fig. S5a, the fluorescence of SiNPs@GSH-AuNCs at 570

nm in the absence and presence of Zn^{2+} is expressed as I_0 and I, respectively. When the concentration of GSH-AuNCs is 26 μg/mL, the 4.6 folds increase in luminescence at 570 nm can be attained after the addition of 50 μM Zn^{2+}. As illustrated in Fig. S5b, the fluorescence intensity ratio (I_{570}/I_{450}) of SiNPs@GSH-AuNCs tends to increase first and then decrease with the increasing pH values from 1.0-12.0 after adding Zn^{2+} (50 μM), and the maximum ratio is obtained in pH 8.0. Thus, the pH 8.0 in HEPES buffer is chosen as the ideal reaction pH. Additionally, the complete interaction between the SiNPs@GSH-AuNCs and Zn^{2+} can be achieved in 5 min, indicating a rapid reaction rate, so 5 min is selected as the optimum reaction time (c).

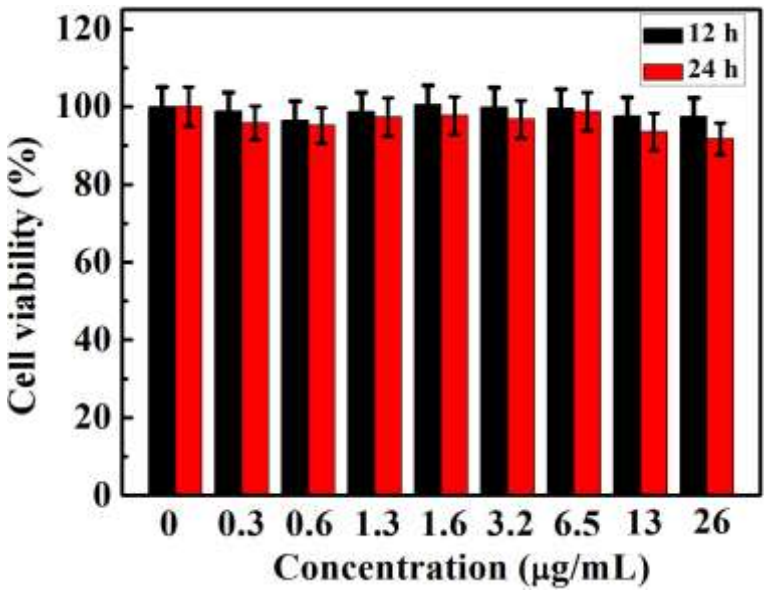

Fig. S7 Cell viability values (%) estimated by CCK-8 assay of H1688 cell after 12 h and 24 h incubation with the different concentration of SiNPs@GSH-AuNCs. The concentration of SiNPs (624.5 μg/mL) is fixed and the concentrations of GSH-AuNCs is varied from 0 to 26 μg/mL.