Supporting information

Stable and Oxidant Responsive Zwitterionic Nanoclusters

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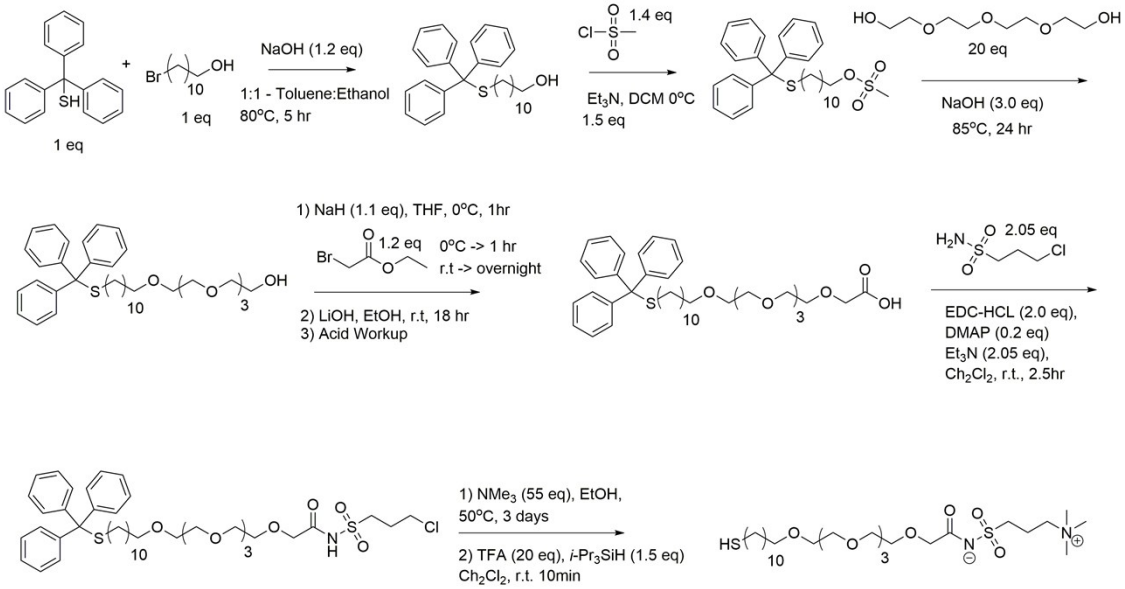
Chemicals. Chloroauric acid (≥99.8%) used for gold nanoparticle synthesis was bought from Strem Chemicals Inc. (Newburyport, MA). Sodium borohydride was purchased from Acros (New Jersey, USA). Hydrogen peroxide (H_2O_2), ferrous chloride, and ascorbic acid (AA) were purchased from Sigma-Aldrich. Unless otherwise noted, all chemicals were used as received without further purification and Milli-Q water (18.2 MΩ•cm, Millipore System Inc.) was used throughout this study.

Synthesis scheme of sulfonamide-based monothiol zwitterionic ligand



Selectivity test. To evaluate the selectivity of AuNC/•OH system towards AA, fluorescence intensity of AuNC (100 nM) /•OH (80 μM) system (blank) in the presence of 200 μM K^+, Na^+, Ca^{2+}, Zn^{2+}, Fe^{3+}, bovine serum albumin (BSA), glutathione (GSH), glucose(Glu), and ascorbic acid(AA), were recorded using a fluorescence spectrometer, respectively.

Real sample test. For real sample test, the orange juice was first diluted using 10 mM PBS (pH 5.0) by 10, 100, and 1000 fold, respectively. Then the diluted samples were tested following the procedure for AA detection. The fluorescence intensity was recorded and the concentrations were calculated according to the linear relationship (Y=19.9+0.42X) between the fluorescence intensity and the concentration of AA in Figure 3B, respectively.

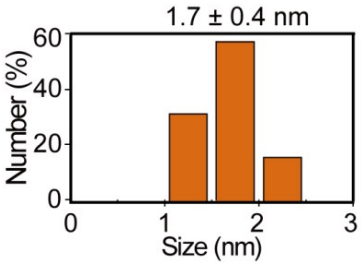


Fig. S1. The size distribution histogram of as-synthesized fluorescent zwitterionic AuNC, was measured and statistically analyzed from the TEM images.

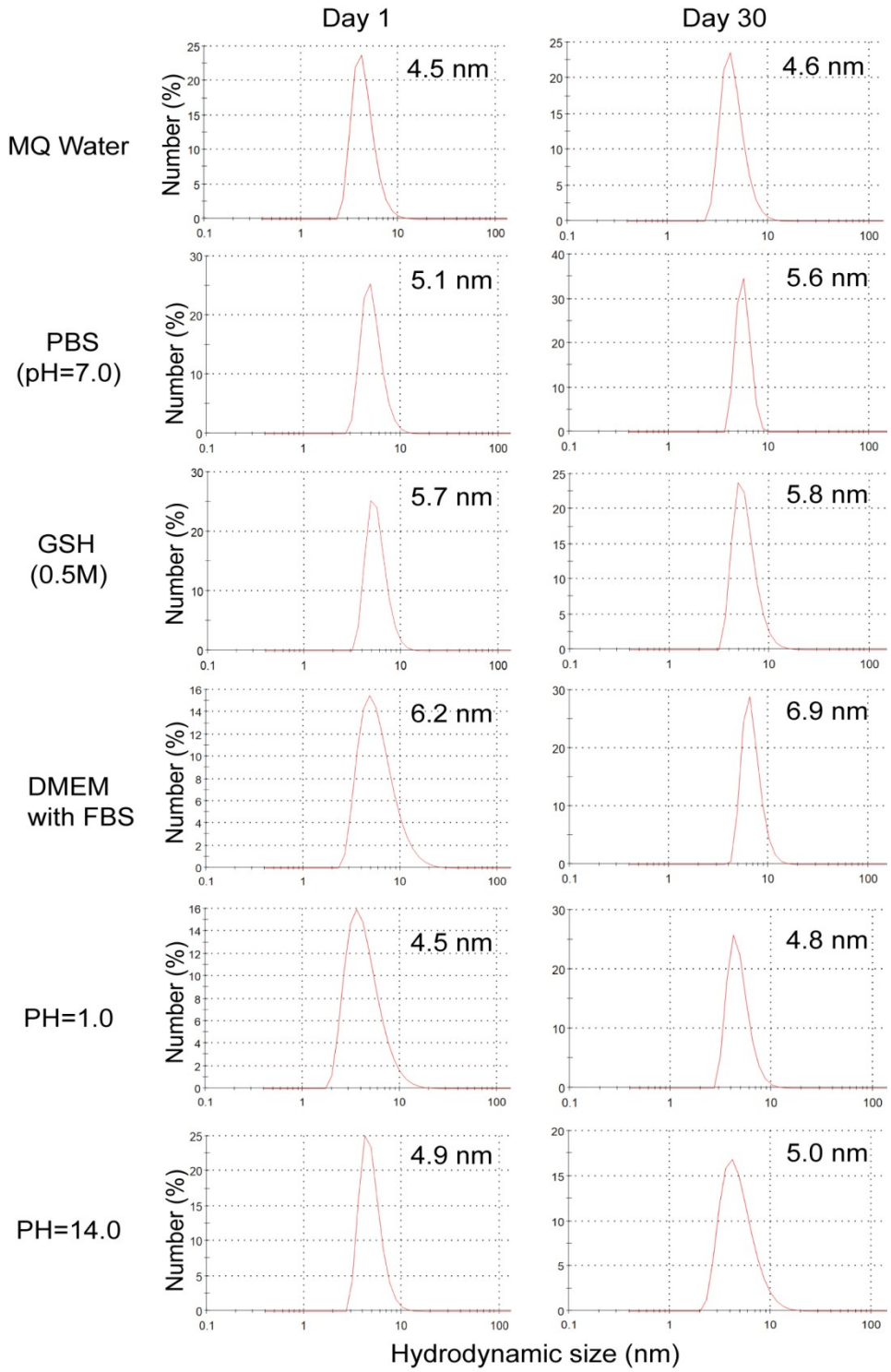


Fig. S2. Hydrodynamic size characterization of as-synthesized fluorescent zwitterionic AuNC in different buffers (MilliQ water, PBS, GSH, and 10% FBS containing DMEM), and pH (1.0 and 14.0) for 1 day and up to 30 days (keep in dark at room temperature).

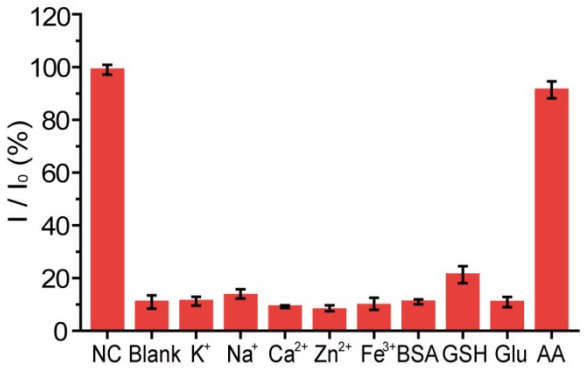


Fig. S3. Fluorescence response of AuNC (100 nM) /•OH (80 μM) system (blank) in the presence of 200 μM K^+, Na^+, Ca^{2+}, Zn^{2+}, Fe^{3+}, bovine serum albumin (BSA), glutathione (GSH), glucose (Glu), and ascorbic acid (AA), respectively.

Table S1. The AA concentration test in real orange juice sample using AuNC/•OH system after dilution. The AA content of the commercial orange juice is indicated ~36mg/100mL. Mean values ± standard deviation, N = 3.

Juice samples (diluted)	Fluorescence intensity	Concentration (μM)	Concentration before dilution (mg/100mL)
1 (X10)	100.5 ± 3.1	192.1 ± 6.0	32.9 ± 1.3
2 (X100)	30.1 ± 1.1	24.2 ± 2.4	41.5 ± 3.9
3 (X1000)	19.1 ± 0.3	–	–

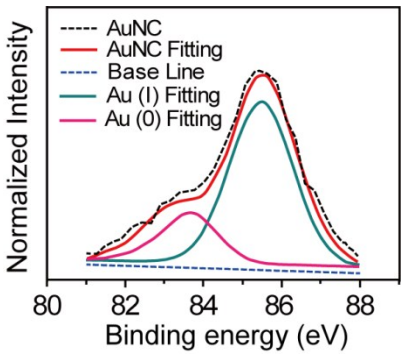


Fig. S4. X-Ray photoelectron spectroscopy (XPS) measurement of AuNC being treated with •OH, base line (blue curve), measured line of Au NC (black curve), fitting line of Au NC (red curve), fitting line of Au(I) (green curve), and fitting line of Au(0) (pink curve).