Electronic Supplementary Information (ESI) for

Colorimetric detection of quaternary ammonium surfactants using citrate-stabilized gold nanoparticles (Au NPs)

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Experimental details:

The preparation of citrate-stabilized Au NPs: 0.019g HAuCl₄ • 4H₂O was dissolved in 100 mL ultrapure water. The solution was transferred into the flask with reflux and was heated with stirring. After the solution boiling, 4 mL citrate sodium solution (C₆H₅Na₃O₇ • 2H₂O, 1.14 g/100 mL) was quickly added into the solution, allowed to react for 60 minutes. The resulting wine red colloidal Au NPs were finally obtained.

UV-vis absorption spectra were recorded by UV-3600 spectrophotometer (Shimadzu, Japan). Transmission electron microscopy (TEM) was recorded by a JEM-2100 electron microscope (JEOL, Japan) at 200 KV. All of the chemicals were of analytical grade. The water used throughout all experiments was purified by a Elix 5 Pure Water System (Millipore, USA).

Determination of BZKB in disinfectant residual sample by RP-HPLC was performed with Elite P230 chromatographic system (Dalian, China) containing a Beckman Ultrasphere ODS column (4.6 mm×25 cm, 5 µm particle) at 40 °C. The
mobile phase was consisted of acetonitrile and 0.02 mol/L NaClO₄ solution (v:v = 7:3, pH 2.7). The flow rate was 1 ml/min, UV detection was performed at 258 nm.

**Fig. S1** Absorbance ratio $A_{650}/A_{525}$ of the Au NPs solutions with addition of 1 µM TTAB against pH.
Fig. S2 Colorimetric response of AuNPs solution upon the addition of various anionic salts. (A) NaClO₄; (B) Na₂SO₄; (C) Na₃PO₄; (D) NaNO₃; (E) NaCl; (F) Na₂SO₃.

Linear relationship of the peak area over the known concentration ranges for BZKB by RP-HPLC was obtained, which was shown in Fig. S3. The linear range of concentration of BZKB is from 0.03 to 0.15 mg/mL. The linear regression equation was \( y = 987.6x + 10.26 \) (R=0.997). The result of disinfectant residual sample by RP-HPLC was shown in Fig. S4. The peak area of BZKB in the disinfectant residual sample was 96.25 (t=17.26 min), so the concentration of BZKB in the disinfectant residual sample was 0.0871 mg/mL (2.267×10⁻⁴ M).
**Fig. S3**  The calibration curve for BZKB detection by RP-HPLC

**Fig. S4**  The chromatogram of disinfectant residual sample by RP-HPLC