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Electronic Supporting Information

for

A simple green route to prepare stable silver nanoparticles with pear juice and a new selective colorimetric method of cysteine

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Experimental Details

SEM imaging

5 μL samples were dropped onto the silicon film and dried, then washed with water to purify the samples. After drying again at room temperature, the samples were performed for SEM measurements at a voltage of 20.0 kV and a working current of 10.0 μA.

Dark-field light scattering imaging of AgNPs

The samples were prepared following the standard procedure, which were dropped onto the slide and sealed up with cover glass, and then transferred to dark-field microscope for light scattering imaging. The Olympus BX51 microscope (Tokyo, Japan) was equipped with a high numerical dark-field condenser (U-DCW, 1.2-1.4) and a DP72 single trip color CCD camera (Tokyo, Japan), which was controlled by Image-Pro Express software (Media Cybernetics, USA), was used for imaging with a 100× /1.3 oil Iris objective (UPLANFLN, adjustable numerical aperture, from 0.6 to 1.3).

Cell culture and cell viability assay

Hep-2 cells were cultured in RPMI1640 culture medium with 10% fetal bovine serum (FBS, Invitrogen) and 1% penicillin/streptomycin (Invitrogen) in a Nuare DHD autoflow CO_2 air-jacketed incubator at 37 ^{o}C under 5% CO_2. Then, known amounts of AgNPs were added to cells that in RPMI1640 culture medium. After the incubation for 24 h, cells were washed with phosphate-buffered saline (PBS) for three times. In a 96-microwell plate, 10 μL Cell Counting Kit-8 (Beyotime Institute of Biotechnology) and 90 μL PBS solution was added into cells, 1 h later, the cell viability was analyzed by detecting the absorbance at 450 nm with a Spectra max 190 Microplate Spectrometer System (Shanghai, China).

Bacterial culture and antibacterial activity assay

Luria-Bertani (LB) broth used for growth containing 10g/L tryptone, 5 g/L yeast extract and 10 g/L NaCl, which was autoclaved for 30 min prior to use. In this work, *Escherichia coli*, *staphylococcus aureus*and *pseudomonas aeruginosa* bacteria were studied for antibacterial activity assay, which were prepared as follows: a small amount of frozen bacteria were transferred from a -80 ^{o}C glycerol stock into 10 mL glass culture tube in LB media, followed by shaking at 120 rpm and 37 ^{o}C for 24 h (Innova 44

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Incubator Shaker, New Brunswick Scientific). After 24 h incubation, all bacterial culture was transferred in sterile conditions into a 50 mL conical tube for another 24 h incubation at 37 ^{o}C without shaking.

The standard Oxford cup method was used to examine the antibacterial activity of AgNPs against *Escherichia coli, staphylococcus aureus*and *pseudomonas aeruginosa*. 100 μL of AgNPs (including both pear juice and citrate trisodium reduced AgNPs) in BR buffer were added into each Oxford cup (inner diameter 6 mm), and 100 μL pear juice and citrate trisodium in BR buffer was used as negative control. In antibacterial tests, 1 mL freshly grown bacteria was added into 100 mL warm LB agar broth, and then the mixed solutions were poured into aseptic Petri dishes before solidification. Oxford cups with the nanorods and BR buffer were placed on the solid agar plates, which were incubated at 37 °C overnight to obtain the visualized and digital images.

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Figures

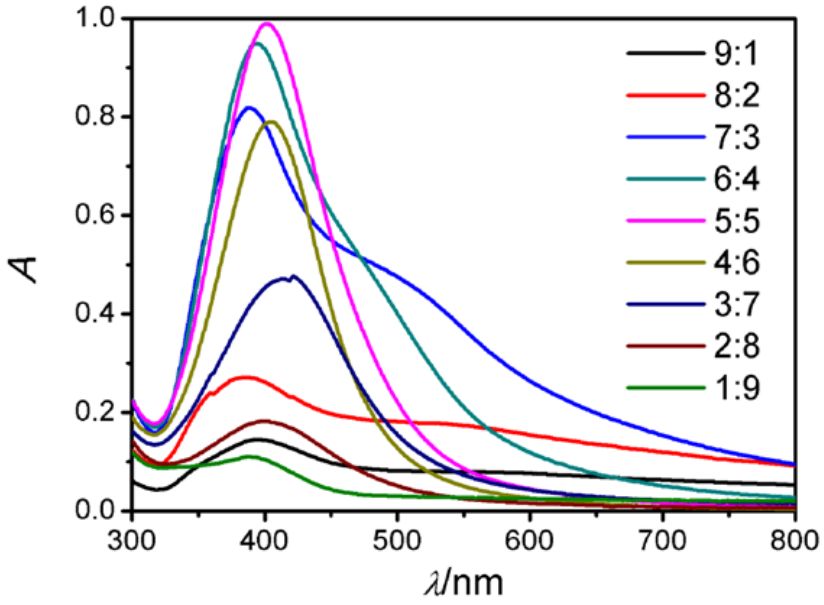

Fig. S1 The dependence of AgNPs synthesis on pear juice concentrations. c_{NaOH}, 1.67×10^{-2} M. The as-prepare AgNPs was diluted by 20 times for scanning the absorption spectra.

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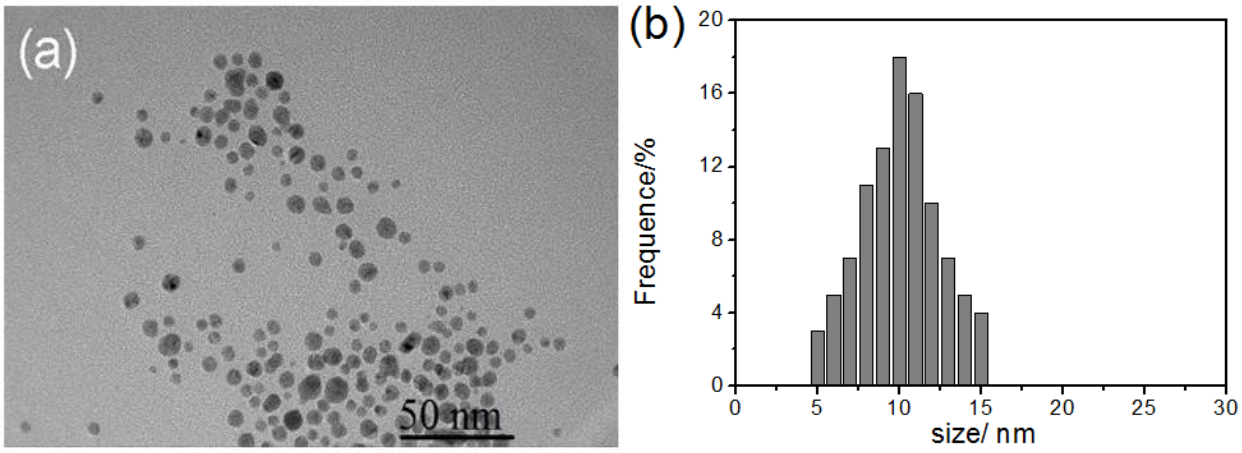

Fig. S2 TEM image of AgNPs and size distribution.

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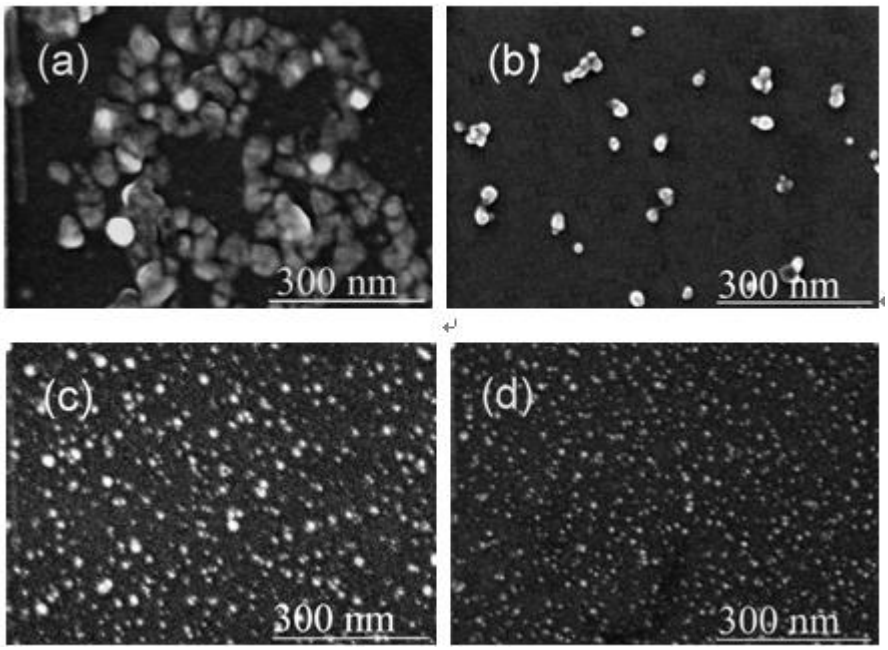

Fig. S3 SEM imagings of AgNPs. Scale bar, 300 nm.

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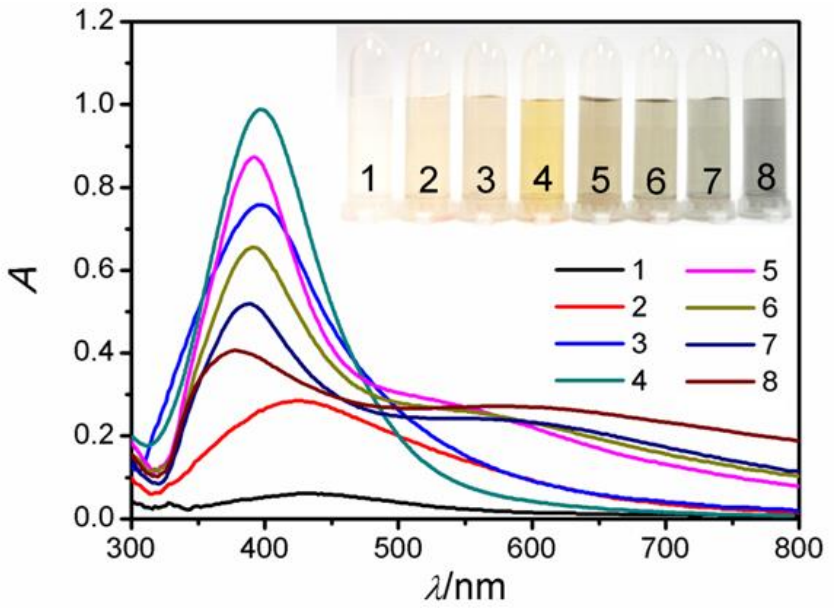

Fig. S4 The dependence of AgNPs synthesis on NaOH concentrations. c_{AgNO3}, 4.17×10^{-3} M; c_{NaOH}, 1, 4.17×10^{-3} M; 2, 8.34×10^{-3} M; 3, 1.25×10^{-2} M; 4, 1.67×10^{-2} M; 5, 2.08×10^{-2} M; 6, 2.50×10^{-2} M; 7, 2.92×10^{-2} M; 8, 3.34×10^{-2} M. Pear juice was used as obtained by keeping the same volume as $AgNO_3$ (0.01 M) and the as-prepare AgNPs was diluted by 20 times for scanning the absorption spectra.

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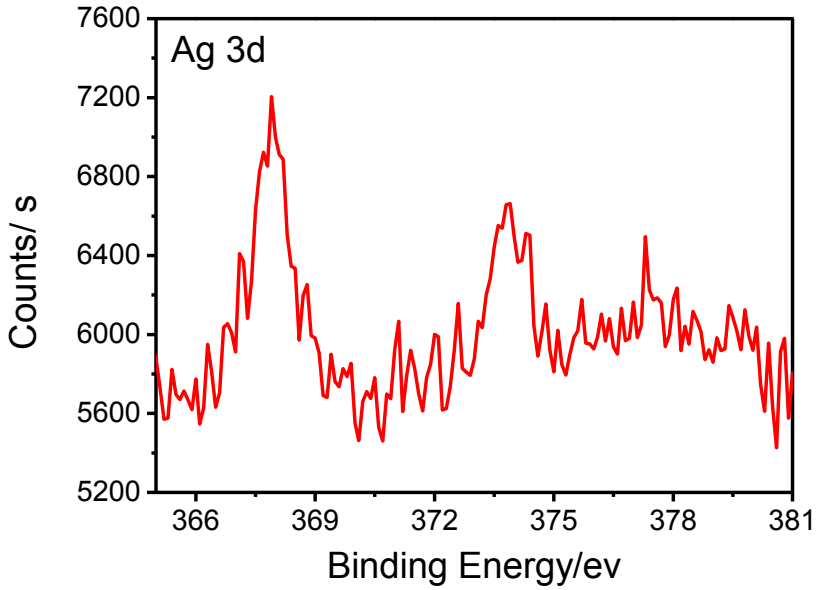

Fig. S5 The Ag^{3d} XPS spectrum of the as-prepared AgNPs.

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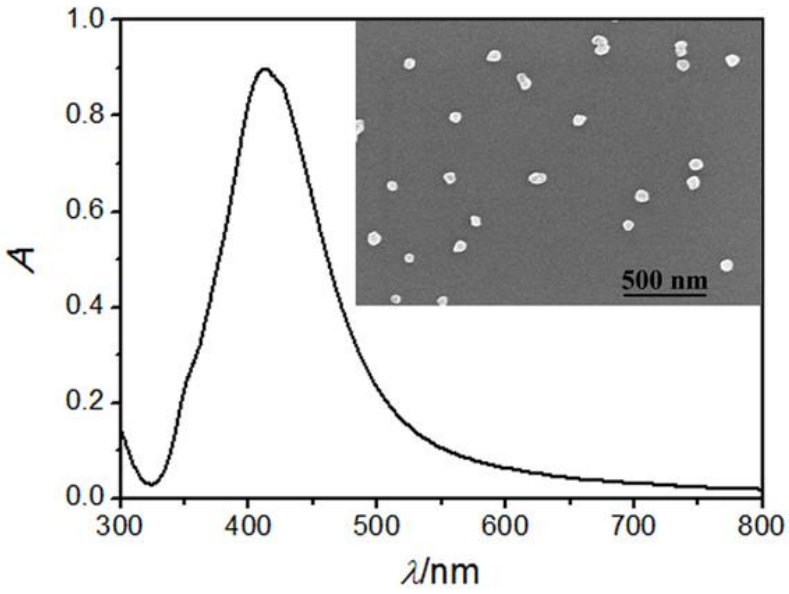

Fig. S6 The absorption spectrum and SEM imaging of AgNPs reduced by citrate trisodium. c_{AgNPs} (calculated by $AgNO_3$), 2.40×10^{-4} M.

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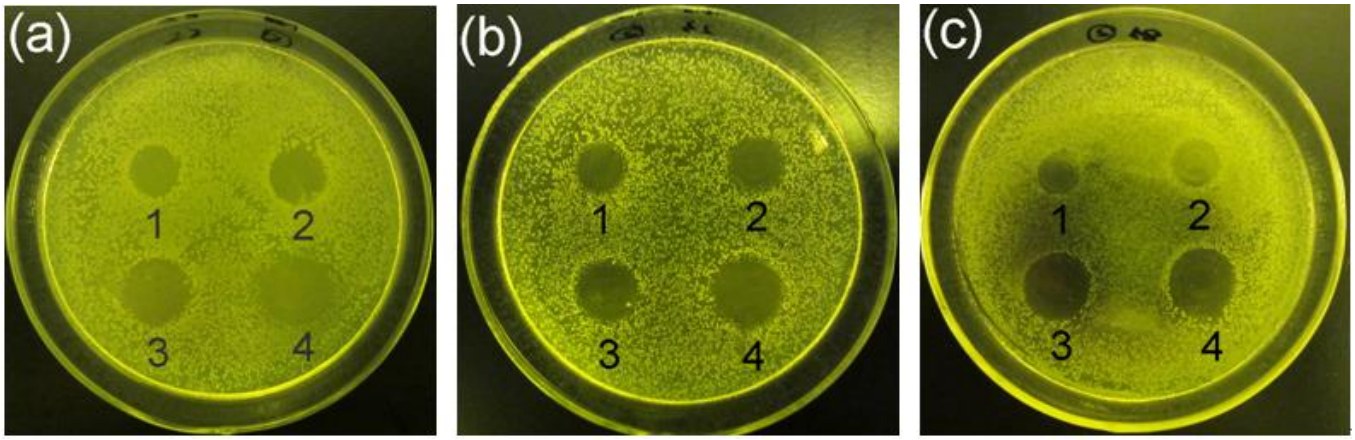

Fig. S7 Antibacterial activity of AgNPs against *pseudomonas aeruginosa* (a), *Escherichia coli* (b) and *staphylococcus aureus* (c). The sizes of AgNPs, 1, 50 nm ; 2, 30 nm; 3, 15 nm; 4, 10 nm. c_{AgNPs}, 1.0×10^{-4} M.

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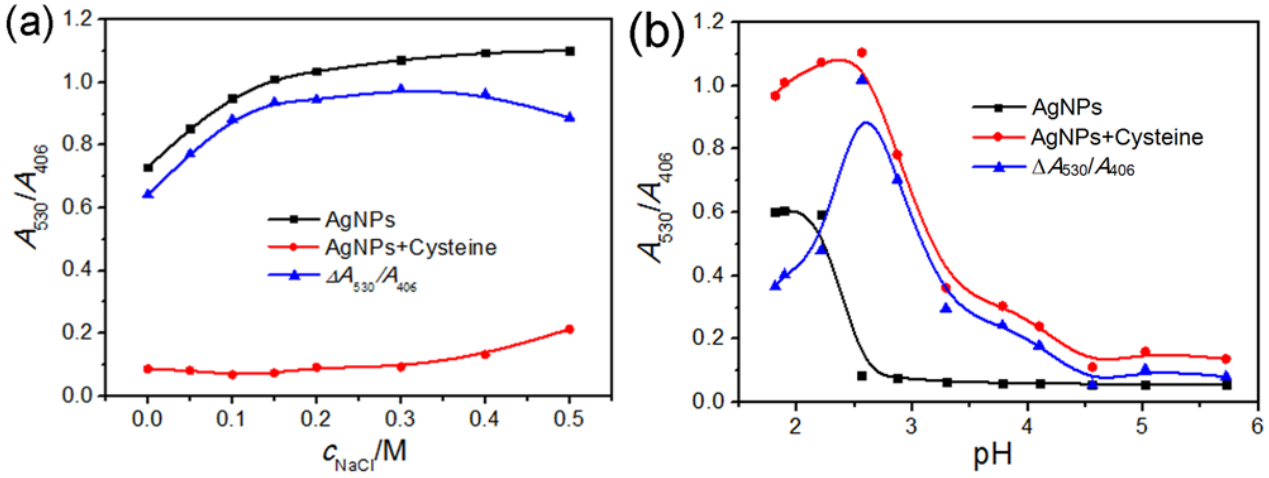

Fig. S8 (a) Effect of concentrations of NaCl on the formation of AgNPs-cysteine aggregates. c_{AgNPs}, 1.67×10^{-4} M (calculated by $AgNO_3$); $c_{Cysteine}$, 8.0×10^{-6} M; pH 2.56. (b) Effect of pH on the formation of AgNPs-cysteine aggregates. c_{AgNPs}, 1.67×10^{-4} M; $c_{Cysteine}$, 8.0×10^{-6} M; c_{NaCl}, 0.2 M.