

SUPPORTING INFORMATION

Cysteine-assisted Overgrowth of Gold Nanorods to Prepare Highly Branched Gold Nanoantennas with Tunable Morphological and Plasmonic Properties

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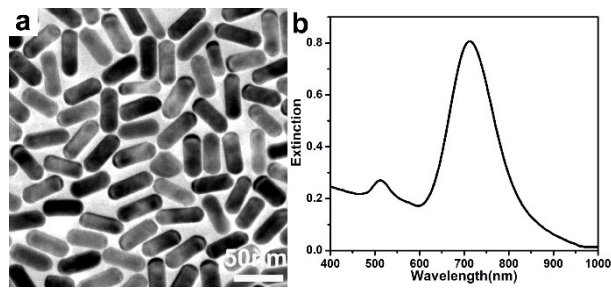


Figure S1. TEM images (a) and Extinction spectra (b) of Au NRs.

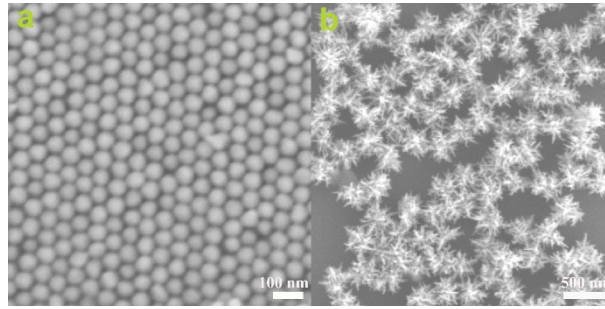


Figure S2. SEM images of 50 nm Au nanosphere (a) and Au nanostars synthesized by using 50 nm Au nanosphere as seeds. The concentrations of CTAC, HAuCl_4 , AA and cysteine in the growth solution are 15 mM and 0.18 mM, 9 mM, and 0.93 μM , respectively.

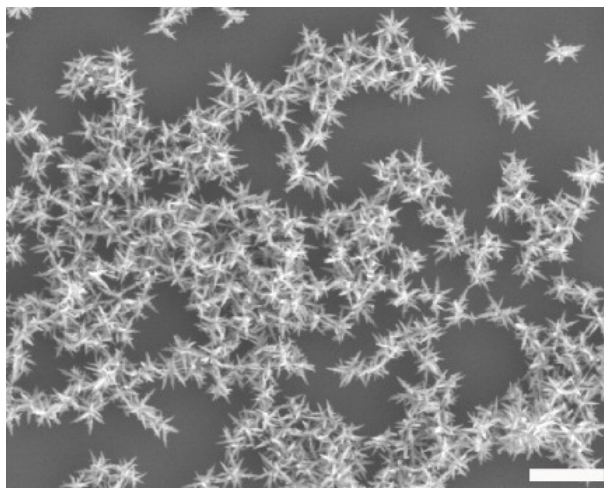


Figure S3. SEM image of AuNPs synthesized at 5 μL volume of as-prepared Au NR solutions in the growth solution. Scale bar is 500 nm.

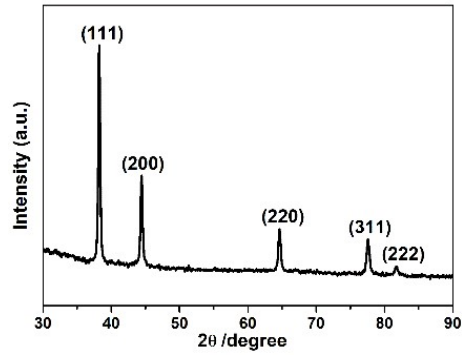


Figure S4. The XRD pattern of the Au nanoantennas.

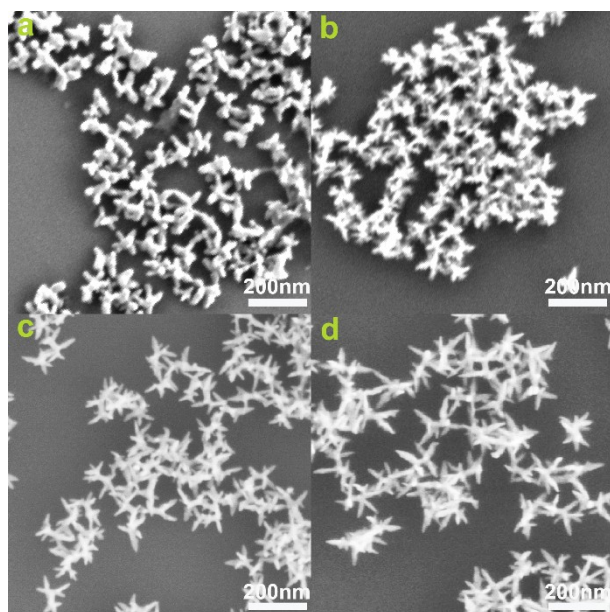


Figure S5. SEM images (a to d) of Au NPs synthesized at different AA concentrations: 1.1 (a), 2.2 (b), 4.5 (c), and 9.0 mM (d). The volume of as-prepared Au NRs solutions in the growth solution is 60 μ L. The concentrations of CTAC, HAuCl₄, and cysteine in the growth solution are 15 mM and 0.18 mM, and 0.93 μ M, respectively.

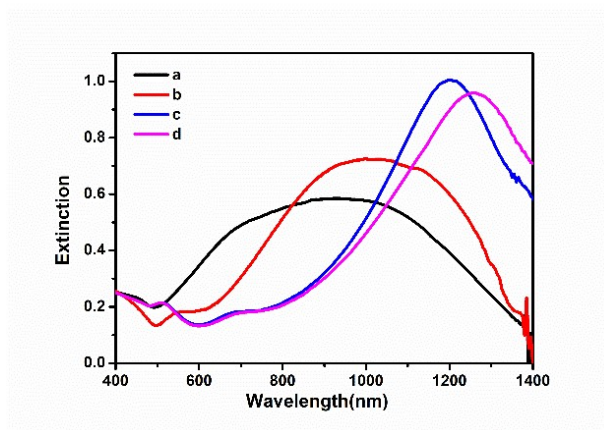


Figure S6. UV-vis-NIR spectra of Au NPs synthesized at different AA concentrations.

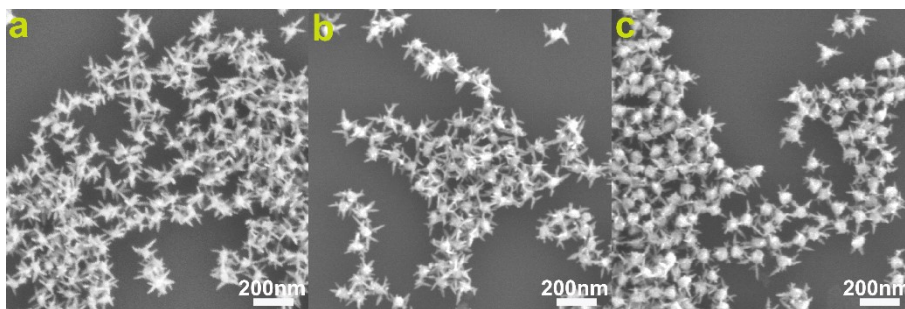


Figure S7. SEM images (a to c) of AuNPs synthesized at different AgNO_3 concentrations: 2.0 (a), 6.0 (b), and 12.0 μM (c). The volume of Au NR solutions in the growth solution is 60 μL . The concentrations of CTAC, HAuCl_4 , AA, and cysteine in the growth solution are 15 mM and 0.18 mM, 9 mM, and 0.93 μM , respectively.

Table S1. Morphological characteristics and extinction peak positions of Au nanoantennas (sample shown in Figure 1) obtained at different concentrations of cysteine in the growth solution.

Samples	Branch Length /nm	Branch Diameter /nm	Branch Aspect ratio	Average numbers of branches	λ_{\max} (nm)
a	73.7 ± 10	42.3 ± 5	1.7	/	704
b	58.4 ± 10	27.8 ± 5	2.1	4	975
c	63.8 ± 10	21.8 ± 5	2.9	6-7	1200
d	67.0 ± 10	18.9 ± 5	3.5	8-10	1375

Table S2. Morphological characteristics and extinction peak positions of Au nanoantennas (sample shown in Figure 2) obtained at different volume of as-prepared Au NRs solutions in the growth solution.

Samples	Branch Length /nm	Branch Diameter /nm	Branch Aspect ratio	Average numbers of branches	λ_{\max} (nm)
a	/	/	/	0	728
b	24.3 ± 10	13.5 ± 5	1.8	2	965
c	37.5 ± 10	16.3 ± 5	2.3	4	1145
d	48.7 ± 10	18.0 ± 5	2.7	6	1200
e	72.4 ± 10	20.1 ± 5	3.6	8	1340
f	105.5 ± 10	26.2 ± 5	4.0	10	>1400

Table S3. Morphological Characteristics and Extinction Peak Positions of Au nanoantennas (sample shown in Figure 4) obtained at different concentrations of HAuCl₄ in the growth solution.

Samples	Branch Length /nm	Branch Diameter /nm	Branch Aspect ratio	λ_{\max} (nm)
a	48.5 ± 10	14.0 ± 5	3.5	1320
b	63.8 ± 10	21.8 ± 5	2.9	1200
c	77.2 ± 10	30.7 ± 5	2.5	1140
d	94.3 ± 10	43.9 ± 5	2.1	850