Electronic Supplementary Material (ESI) for Nanoscale

Electronic Supplementary Material

Crystalline structure-dependent growth of bimetallic nanostructures

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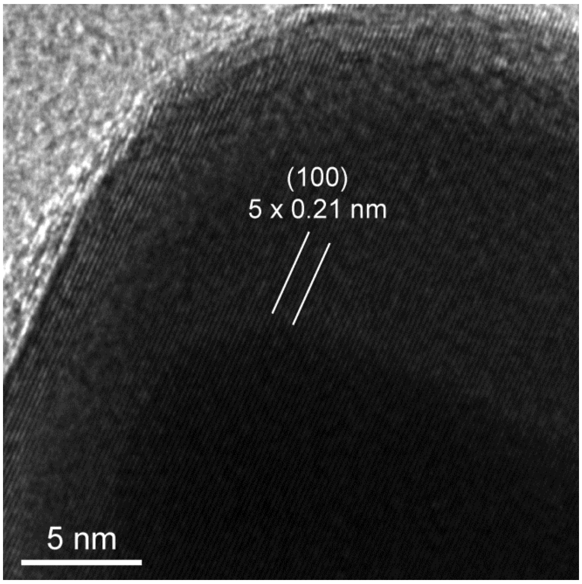

Fig. S1 HRTEM image of a Au–Ag bimetallic nanostructure from the sample grown with the SC Au NRs as the seeds. The sample was grown with 0.48 mL of $AgNO_3$ (0.01 M).

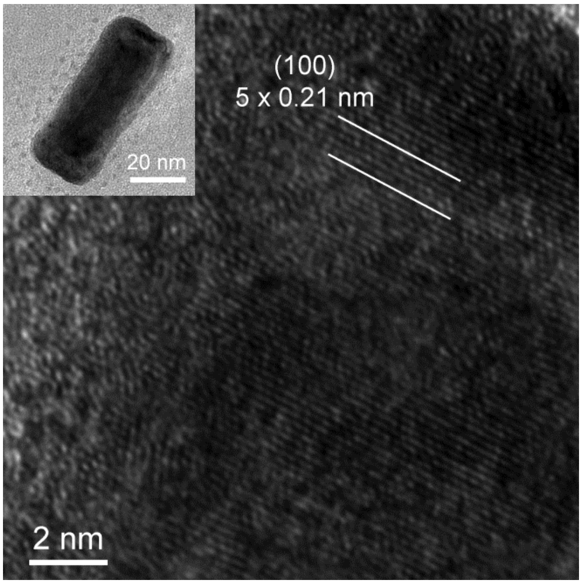

Fig. S2 HRTEM image of a Au–Pd bimetallic nanostructure from the sample grown with the SC Au NRs as the seeds. The inset is the nanostructure on which the HRTEM image was acquired. The sample was grown with 0.18 mL of H_2PdCl_4 (0.01 M).

Table S1 Molar ratios of the metal precursor to gold in the Au nanocrystal seeds and the fractional size (length *L* and width *D*) changes of the bimetallic nanostructures relative to the starting Au nanocrystal seeds

Seed	Au–Ag				Au–Pd			
	Sample	Molar Ratio	$\Delta L/L$	$\Delta D/D$	Sample	Molar Ratio	$\Delta L/L$	$\Delta D/D$
SC Au NRs [L = (75 ± 9) nm, D = (20 ± 2) nm]	A	42.7	0.013 ± 0.077	0.020 ± 0.151	A	14.2	-0.013 ± 0.072	0.051 ± 0.092
	B	85.5	0.036 ± 0.074	0.369 ± 0.094	B	28.5	-0.003 ± 0.076	0.128 ± 0.090
	C	170.8	0.077 ± 0.072	0.533 ± 0.152	C	64.1	0.033 ± 0.076	0.184 ± 0.084
MT Au NRs [L = (85 ± 5) nm, D = (26 ± 2) nm]	B	32.6	0.217 ± 0.103	0.057 ± 0.056	A	8.2	0.125 ± 0.051	0.044 ± 0.051
	C	65.2	0.785 ± 0.134	0.134 ± 0.069	B	32.6	0.325 ± 0.107	0.187 ± 0.087
					C	48.9	0.374 ± 0.101	0.246 ± 0.071
MT Au NBPs [L = (122 ± 9) nm, D = (34 ± 3) nm]	B	4.7	0.003 ± 0.044	0.009 ± 0.045	A	4.7	0.023 ± 0.045	0.007 ± 0.047
	C	9.3	-0.007 ± 0.044	0.005 ± 0.047	B	14.0	0.111 ± 0.055	0.020 ± 0.049
	D	28.0	0.248 ± 0.132	0.013 ± 0.047	C	23.3	0.142 ± 0.055	0.072 ± 0.058

The standard deviations in the fractional size changes were calculated according to the propagation of error in statistics. Take the standard deviation in $\Delta L/L$ as an example:

$$\sigma(\Delta L) = \sigma(L_{\mathrm{bimetallic}}) + \sigma(L)$$

$$\Delta L = L_{\mathrm{bimetallic}} - L$$

$$\sigma\left(\frac{\Delta L}{L}\right) = \sqrt{\left(\frac{\partial\left(\frac{\Delta L}{L}\right)}{\partial(\Delta L)}\right)^2 (\sigma(\Delta L))^2 + \left(\frac{\partial\left(\frac{\Delta L}{L}\right)}{\partial L}\right)^2 (\sigma(L))^2}$$

$$\sigma\left(\frac{\Delta L}{L}\right) = \sqrt{\left(\frac{\sigma(\Delta L)}{L}\right)^2 + \left(\frac{\sigma(L)}{L^2}\right)^2 (\Delta L)^2}$$

In the equations above, $L_{\mathrm{bimetallic}}$, L, $\sigma(L_{\mathrm{bimetallic}})$, and $\sigma(L)$ were obtained by measuring the sizes of the bimetallic nanostructures and the Au nanocrystal seeds on their TEM images. For each sample, 100–120 particles were measured.