Supporting Information

Metal-enhanced fluorescence of gold nanoclusters adsorbed to Ag@SiO$_2$ core-shell nanoparticles

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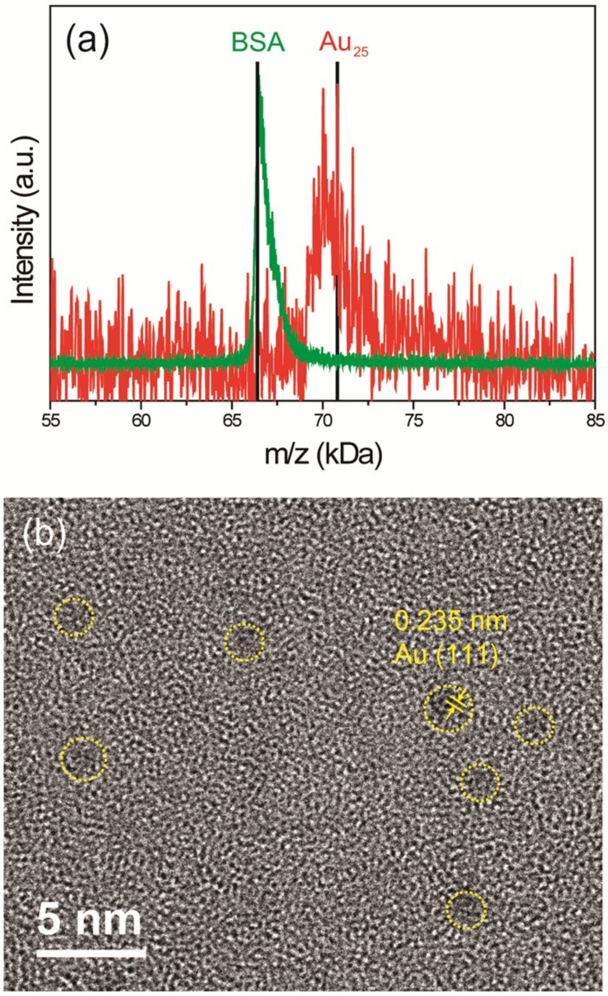

Fig. S1 (a) MALDI-TOF MS of BSA (green) and BSA-capped Au NCs (red). (b) HRTEM image of BSA-capped Au$_{25}$ NCs.

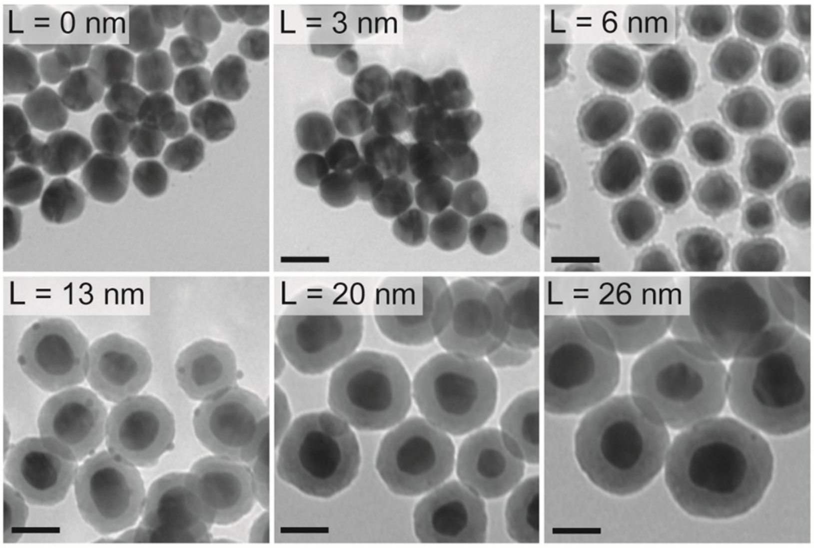

Fig. S2 TEM images of Ag@SiO$_2$(L) NPs, whose L values are indicated inside. Each scale bar indicates 50 nm.

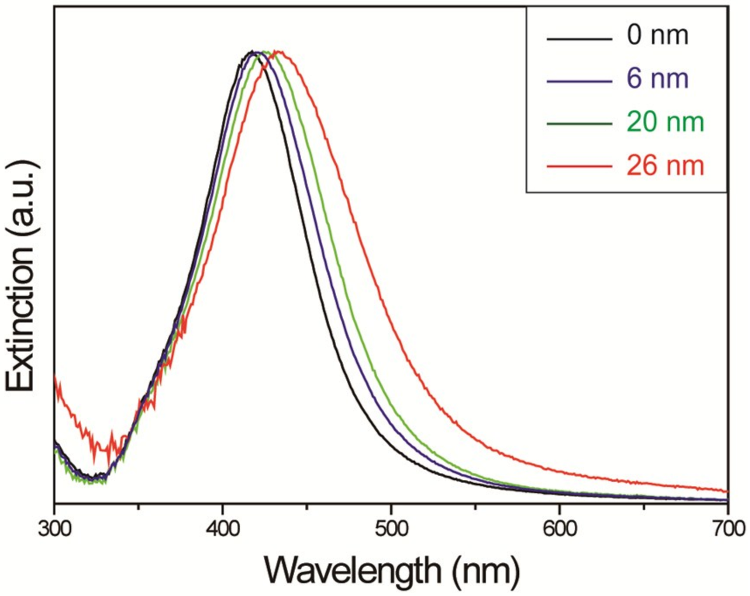

Fig. S3 Extinction spectra Ag@SiO$_2$(L) NPs, whose L values are indicated inside.

Table S1 The fitting details of the PL enhancement factor of Au_{25}-adsorbed $Ag@SiO_2$ NPs as a function of separation between Au_{25} clusters and Ag NPs.

Separation region	Fitting equation	α	β
$d < d_c$ [a]	$EF_1 = (\alpha + \beta d)^6$	1.3	7.5×10^{-3} nm^{-1}
$d > d_c$	$EF_2 = \alpha + \beta/d^3$	3.0	6.7×10^{3} nm^{3}

[a] Maximum enhancement distance (d_c, 11.5 nm) when $EF_1 = EF_2$ = maximum enhancement factor (EF_{max}, 7.4).

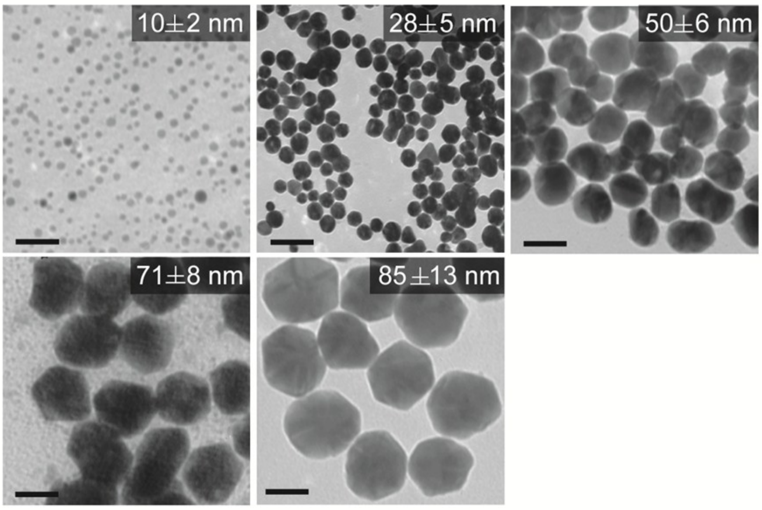

Fig. S4 TEM images of Ag NPs with diverse average diameters indicated inside. Each scale bar indicates 50 nm.

Table S2 Diameters and extinction λ_{max} values of Ag NPs prepared at various concentrations of sodium citrate and tannic acid.

Diameter/nm	λ_{max}/nm	Sodium citrate/mM	Tannic acid/mM
10±2	398	0.81	30.6
28±5	414	0.54	56.4
50±6	433	0.54	94.1
71±8	454	0.27	94.1
85±13	464	0.09	94.1

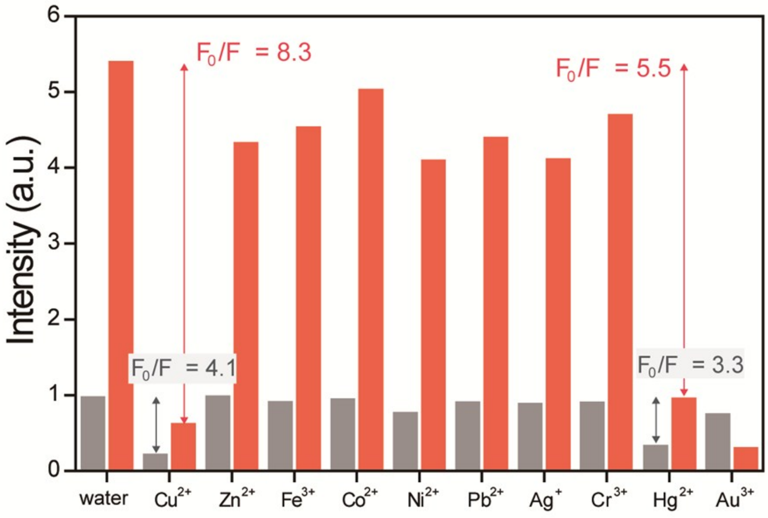

Fig. S5 Sensing selectivity of Au_{25}-adsorbed Ag@SiO_2(0) NPs for Cu^{2+} over other heavy metal ions. The concentrations of the respective metal ions were 20 μM, and samples were excited at 370 nm. The gray bars stand for the PL intensities of free Au_{25} clusters while the red bars stand for the PL intensities of Au_{25}-adsorbed Ag@SiO_2(0) NPs.