

ELECTRONIC SUPPLEMENTARY INFORMATIONS (ESI †)

The intriguing role of L-cysteine on the modulation of chiroplasmonic properties of chiral gold nano-arrows

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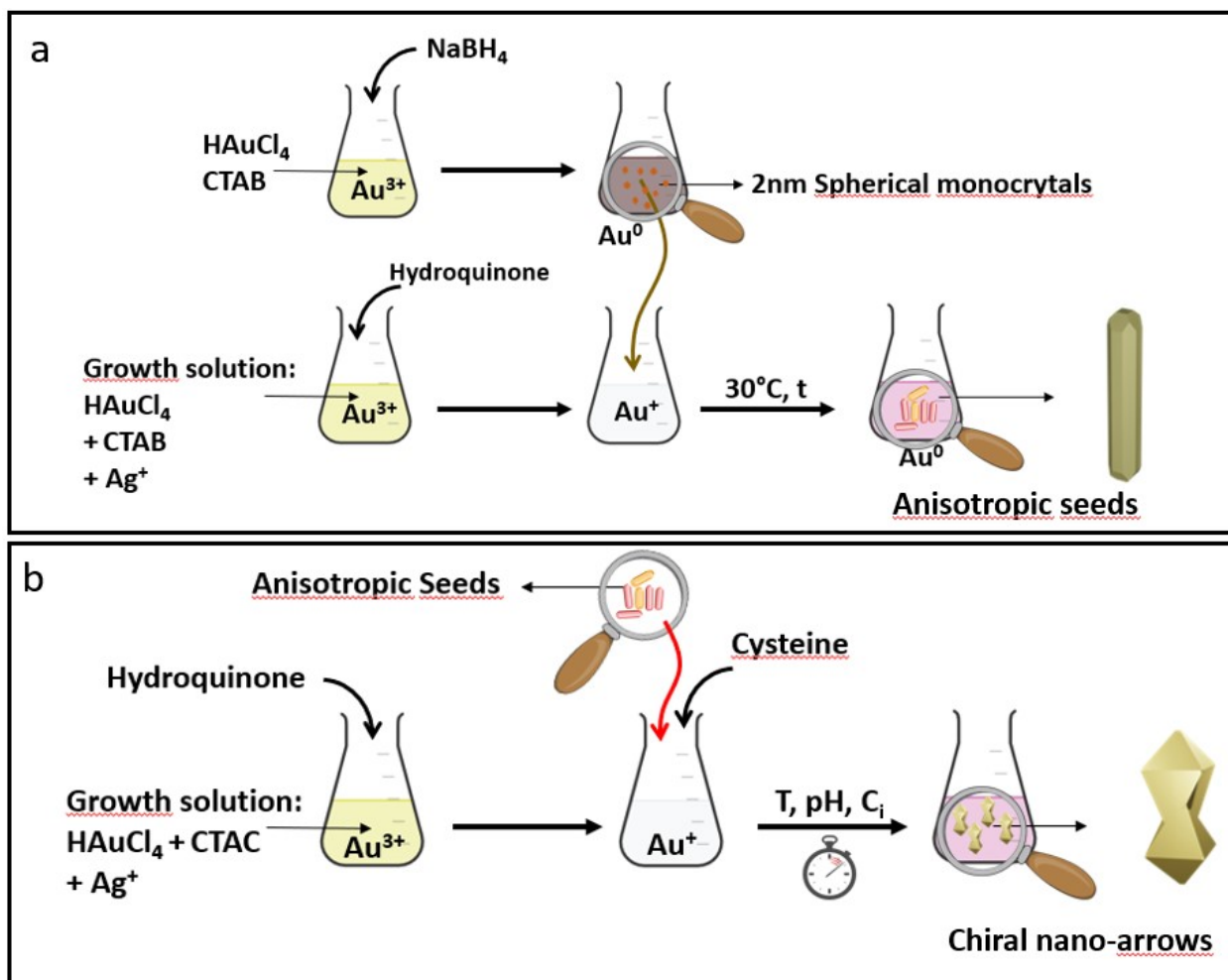


Fig. S1.1 Schematic representation of the synthesis by seeding process a) formation of nanorods seeds and b) their further growth to form nano-arrows.

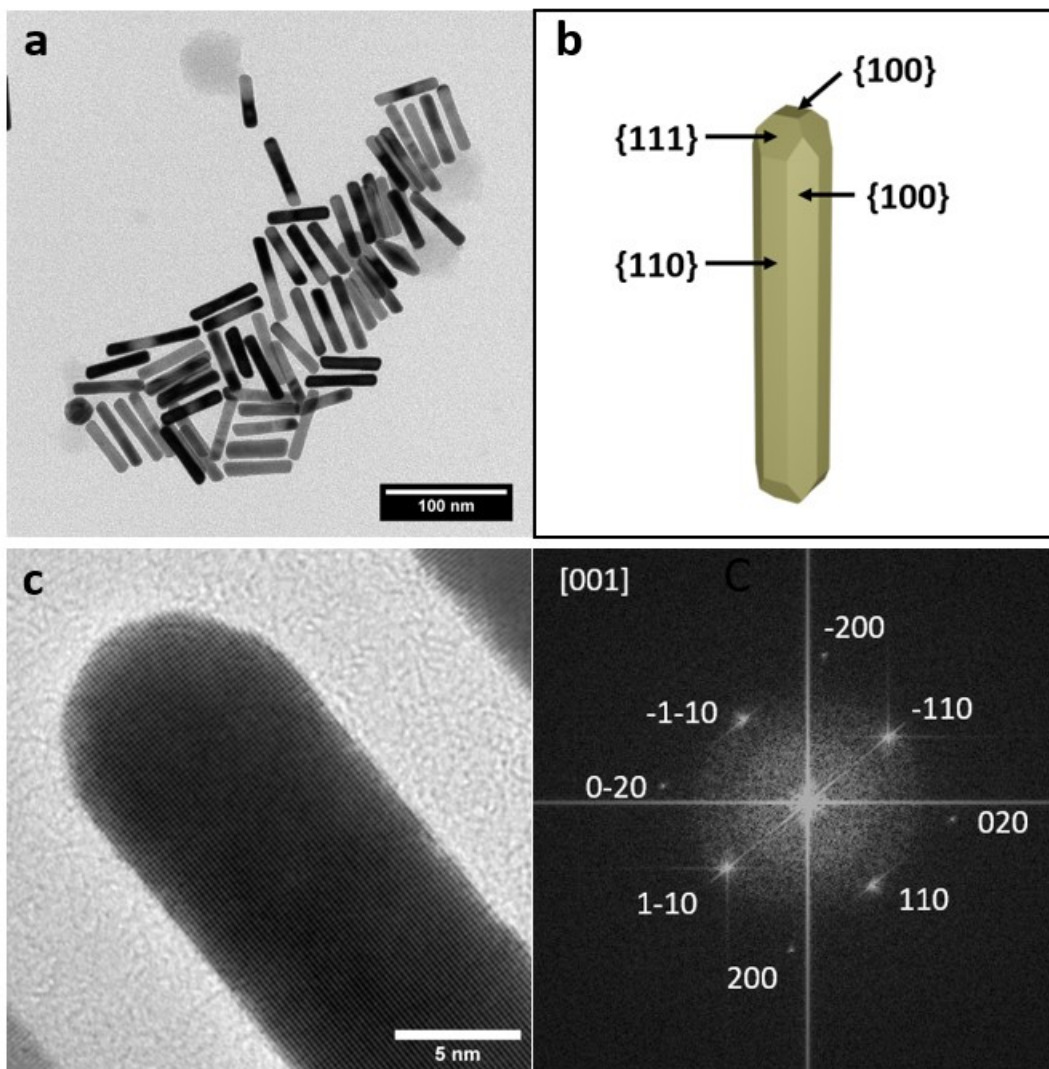


Fig. SI.2 Monocrystalline gold nanorods obtained by seeding process with CTAB and hydroquinone. a) TEM image, b) schematic representation and c) HRTEM image and the corresponding calculated FFT.

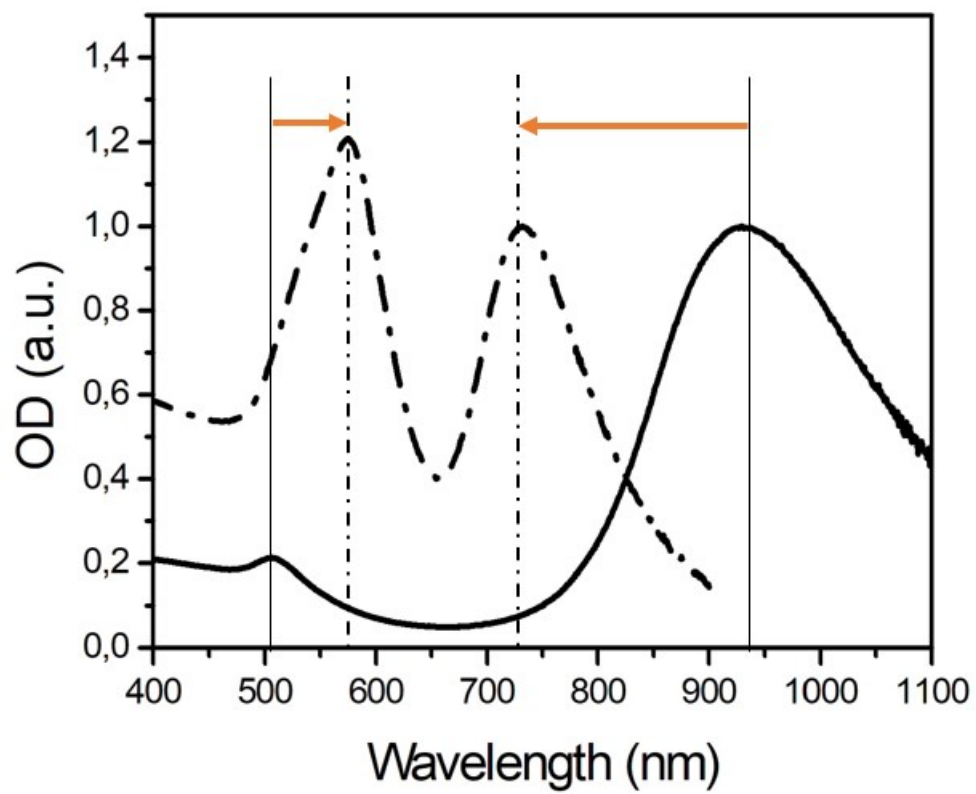


Fig. S1.3 UV-visible spectra of the elongated seeds (straight line) and of the nanoarrows in absence of cysteine (dash-point line).

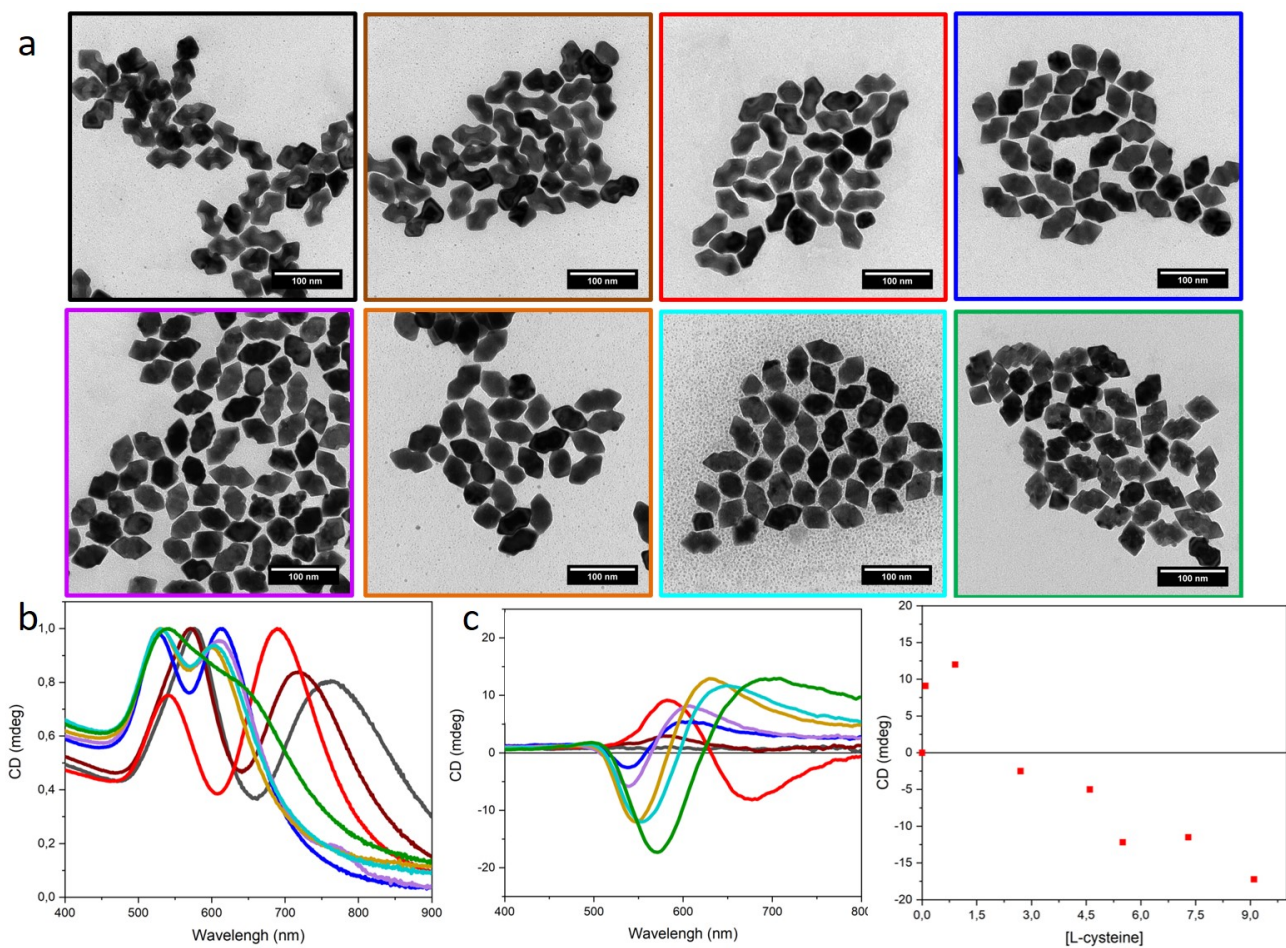


Fig. SI.4 TEM images (a), UV-visible absorption (b) and CD (c) spectra corresponding to nanoparticles obtained at 0 (black), 0.1 (red), 0.91 (dark blue), 2.7 (green), 4.6 (violet), 5.5 (orange), 7.3 (light blue) and 9.1 μmolL^{-1} of cysteine. d) Plot of the intensity of the first band of the corresponding CD signal.

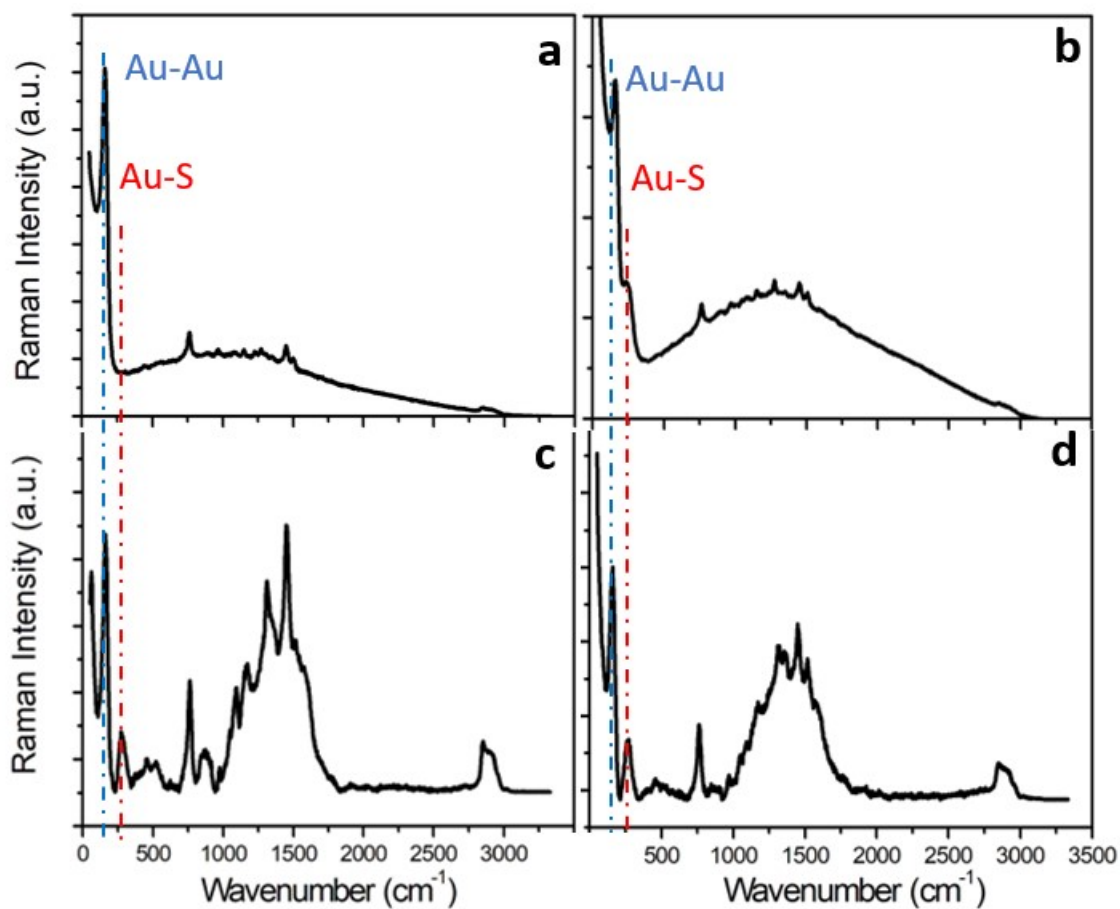


Fig. SI.5 Raman spectra for nano-arrows obtained a) in the absence of cysteine and with a concentration of b) $0.9\mu\text{molL}^{-1}$, c) $2.7\mu\text{molL}^{-1}$ and d) $9.1\mu\text{molL}^{-1}$.

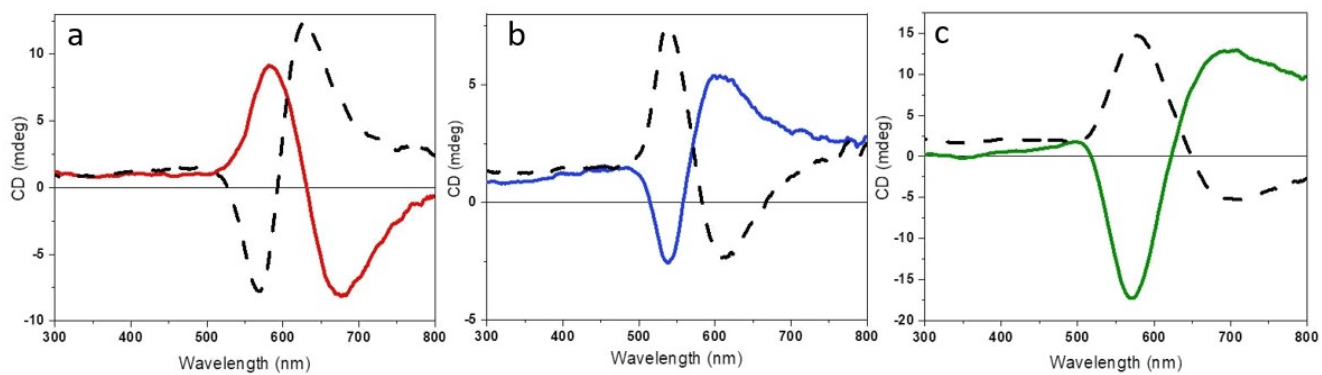


Fig. SI.6 Circular dichroism spectra obtained at a) $0.9\mu\text{molL}^{-1}$, b) $2.7\mu\text{molL}^{-1}$ and c) $9.1\mu\text{molL}^{-1}$ with L-cysteine (straight line) and D-cysteine (dashed line)

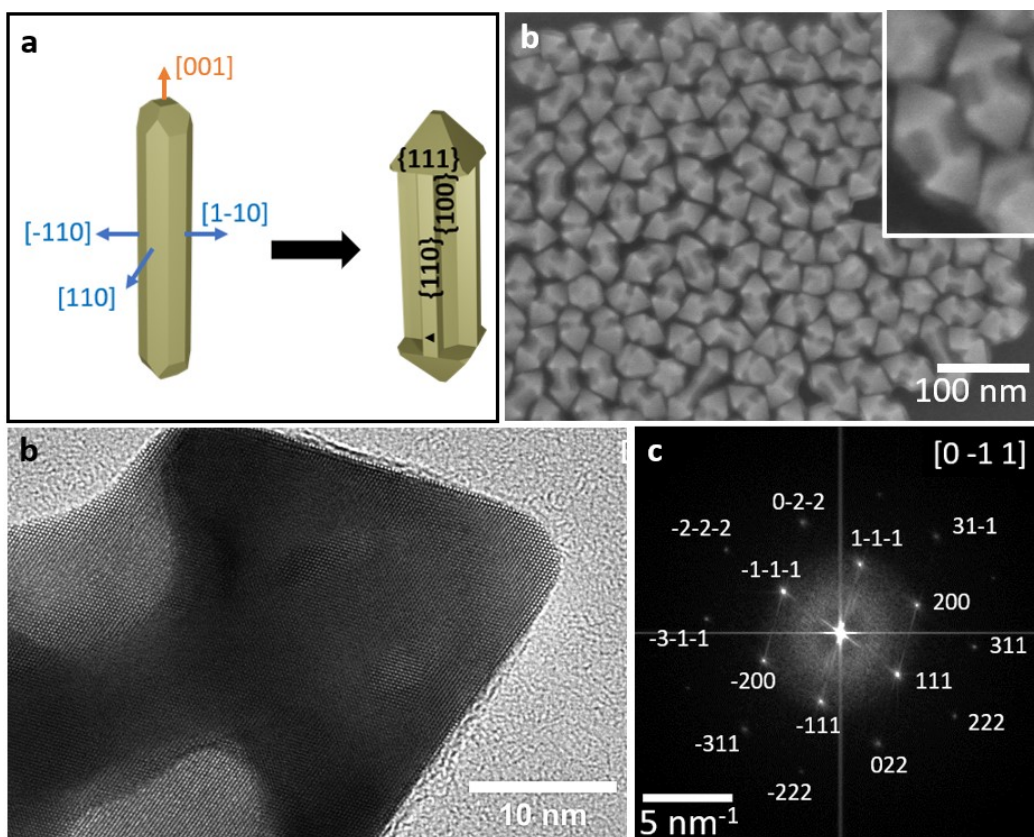


Fig. SI.7 a) schematic growth of nanoarrows from nanorods, b) SEM-FEG image of achiral nanoarrows obtained in absence of cysteine, c) HRTEM image and d) FFT calculated in the overall HRTEM image

	Aspect ratio $AR = \frac{H + h_1 + h_2}{D}$	Volume (nm ³)	Surface (nm ²)
	$AR_{nanorods} =$	$V_{nanorod} = \pi H \left(\frac{D}{2}\right)^2 + \frac{\pi h_1^2}{3} \left[3 \left(\frac{D}{2}\right) - h_1\right] + \frac{\pi h_2^2}{3} \left[3 \left(\frac{D}{2}\right) - h_2\right]$	$S_{nanorod} = \pi D(H + h_1 + h_2)$
	$AR_{arrows} = 2.3 \pm 0,3$	$V_{arrows} = H(D^2 - 4d^2) + (h_1 + h_2) \frac{D^2}{3}$ $V_{arrows} = (24\,760.8 \pm 3816) \text{ nm}^3$ $N_{at/NP} = (1.46 \pm 0.22) 10^6$	$S_{arrows} = 2d \left[\sqrt{h_1^2 + \left(\frac{D}{2}\right)^2} + \sqrt{h_2^2 + \left(\frac{D}{2}\right)^2} \right] + 12dH$ $S_{arrows} = (5\,861 \pm 725) \text{ nm}^2$ $S_{110} = 40.2\%$ and $S_{111} = 59.1\%$

Fig. SI.8 Description of the nano-arrows and their volume and surface determinations.

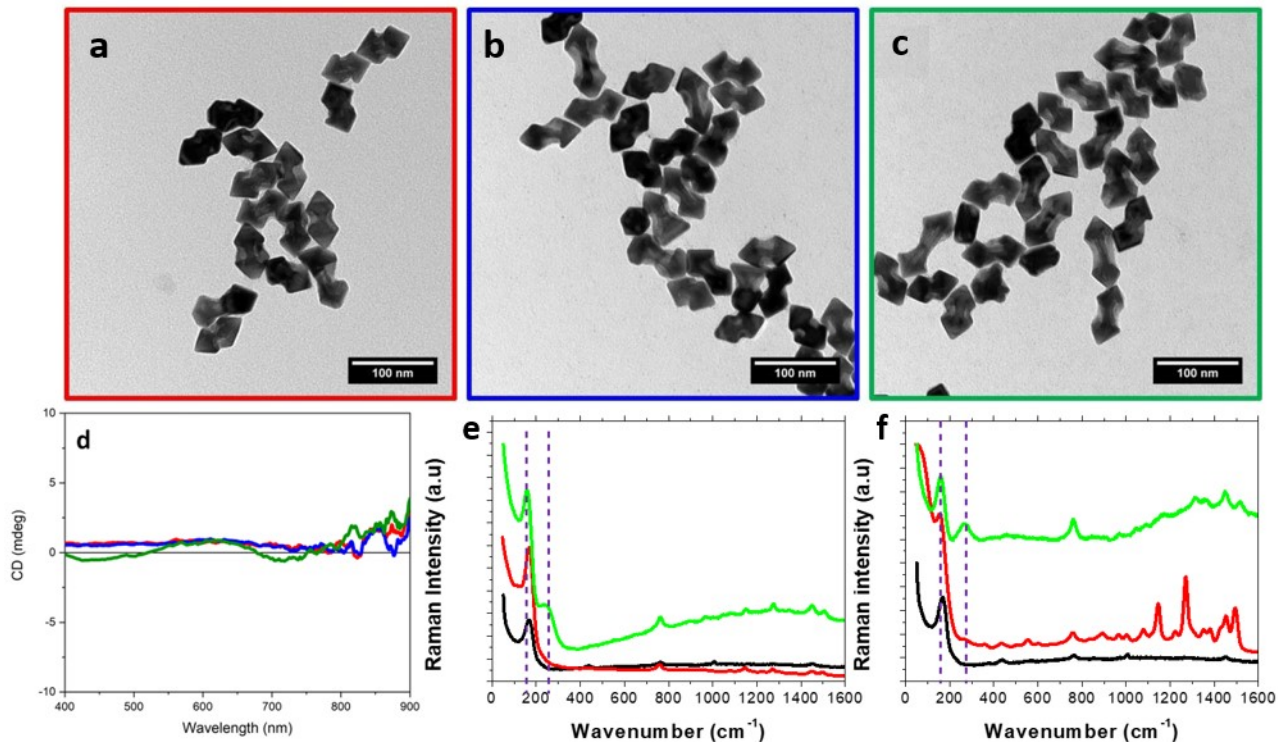


Fig. SI.9 TEM images of nanoarrows synthesized in absence of cysteine and keep after synthesis for 12h in a) $0.9\mu\text{molL}^{-1}$, b) $2.7\mu\text{molL}^{-1}$ and c) $9.1\mu\text{molL}^{-1}$ of L-cysteine. d) the corresponding circular dichroism spectra. Raman spectra before (black) and after functionalization (red) in presence of e) $0.9\mu\text{molL}^{-1}$ and f) $9.1\mu\text{molL}^{-1}$ of cysteine. Green curves correspond to the Raman spectra of arrows growth in presence of cysteine (see Figure SI.5)

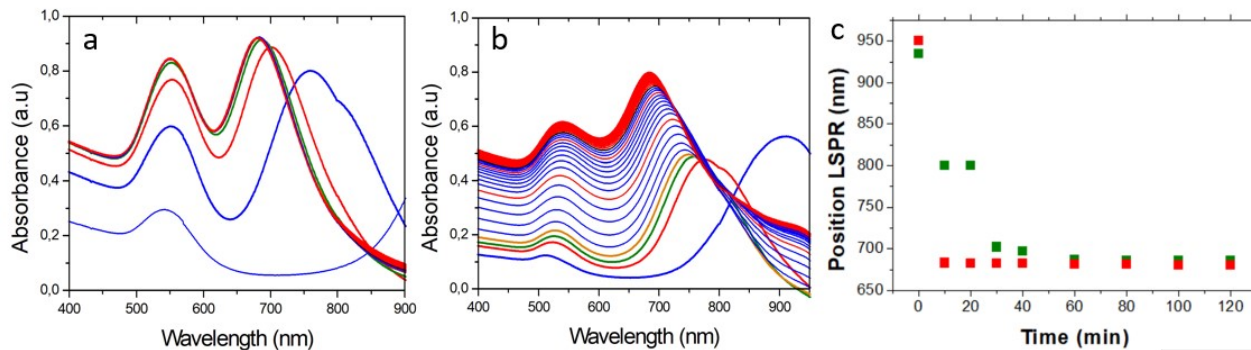


Fig. SI.10 UV-visible spectra monitored during the 240 min of reaction for a) $0.9\mu\text{molL}^{-1}$ and b) $9.1\mu\text{molL}^{-1}$ of L-cysteine. c) Plotted positions of the longitudinal-LSPR during the growth for $0.9\mu\text{molL}^{-1}$ (red) and $9.1\mu\text{molL}^{-1}$ (green) of L-cysteine.

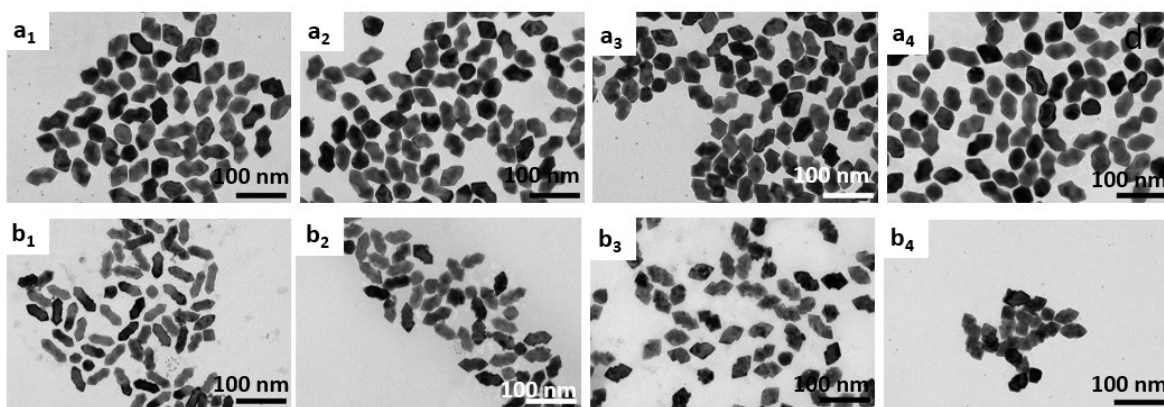


Fig. SI.11 : TEM images of extracted nanoparticles obtained in presence of $0.9 \mu\text{molL}^{-1}$ (labeled a_x) and $9.1 \mu\text{molL}^{-1}$ of cysteine (labeled b_x) at different time of reaction of 10 min ($x=1$), 30 min ($x=2$), 60 min ($x=3$) and 120 min ($x=4$).

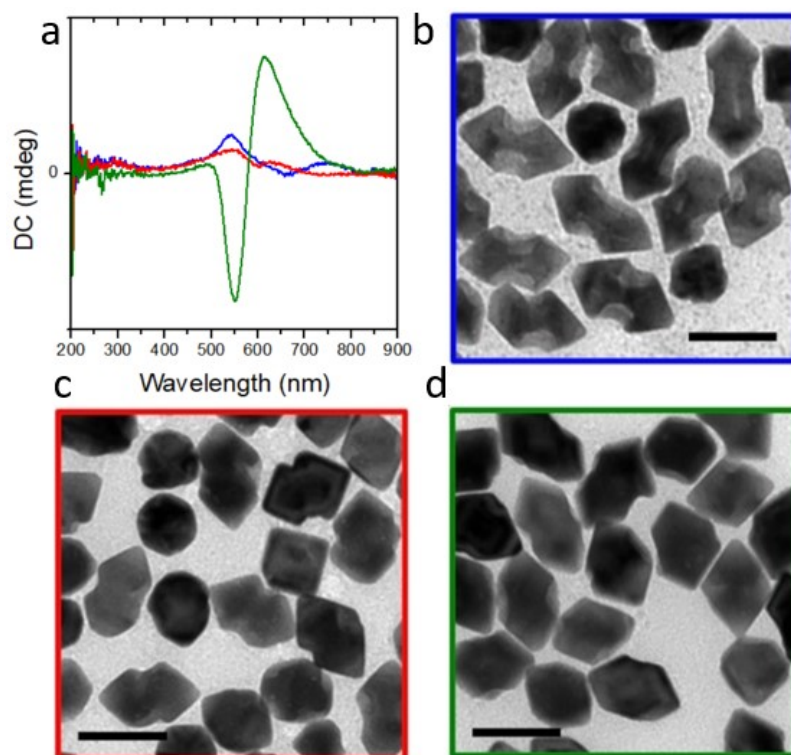


Fig. SI.12 CD spectra and TEM images of gold nanoparticles obtained in the presence of a) $0.9 \mu\text{molL}^{-1}$ (blue), b) $2.7 \mu\text{molL}^{-1}$ (red) and c) $9.1 \mu\text{molL}^{-1}$ (green) of glutathione. The scale bar corresponds to 50 nm.

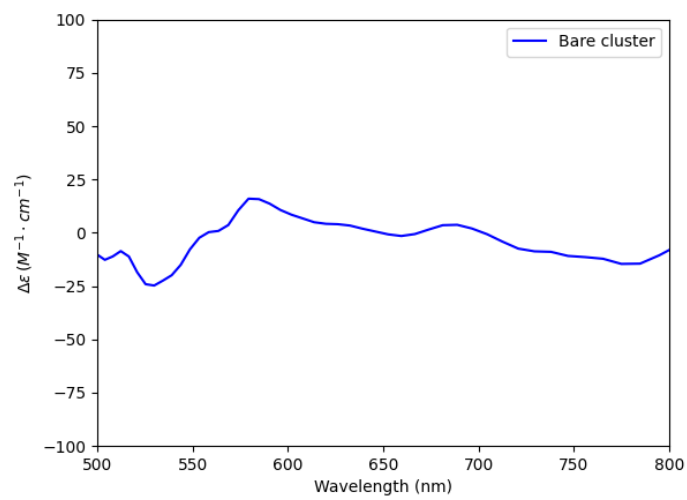


Fig. S1.13 Theoretical CD spectrum of the bare Au₆₄ cluster.