Supporting Information

Synthesis of Stable Citrate-Capped Silver Nanoprisms

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Instability Calculation:

Instability was calculated using the ratio of Jaccard distance to Jaccard Similarity Index which quantify dissimilarity and similarity between two spectra, respectively.[23] The Jaccard Similarity index is defined as the intersection between two spectra – A and B - divided by their union, or $J = {(A \cap B)}/{(A \cup B)}$, where ∩ denotes the intersection and ∪ denotes the union. This gives a metric between 0 and 1, where 1 indicates a perfect match between the curves. The Jaccard distance quantifies differences between two spectra and is defined as 1 – J. Therefore, the Instability = dissimilarity/similarity = ${[(A \cup B) - (A \cap B)]}/{(A \cap B)} = {(A \oplus B)}/{(A \cap B)}$, where ⊕ denotes the logical term "exclusive or". The similarity between the curves, the denominator - (A ∩ B), was calculated as $(\Sigma A_n + \Sigma B_n - \Sigma|A_n\text{-}B_n|)$ where A_n and B_n are optical densities at wavelength n with sum over all wavelengths. Than the numerator was calculated as $(\Sigma A_n + \Sigma B_n) - (\Sigma A_n + \Sigma B_n - \Sigma|A_n\text{-}B_n|) = \Sigma|A_n\text{-}B_n|$. After substituting A_n with the notation for the initial spectrum - I^n_{init} and B_n with the spectrum after 24 hours - I^n_{24h} and taken into account normalization to the area under the curve the equation for instability becomes Instability = ${(\sum |I^n_{init} - I^n_{24h}|)}/{(2 - \sum |I^n_{init} - I^n_{24h}|)}$, please, note that $\Sigma|I^n_{init} - I^n_{24h}| < 2$.

Peak-FWHM (Peak Full Width Half Maximum) Polynomial Regression

Third-order polynomial fits were used to fit scatter plots showing dependence of peak full-width at half-maximum (peak-FWHM) as a function of absorbance peak wavelength for varied trisodium citrate (TSC) concentrations in Fig. 5c.

The parameters of fitting curves are listed below:

0.71 mM: $4730.2 - 23.536\lambda + 0.0386\lambda^2 - 0.00002\lambda^3$

1.79 mM: $194.35 - 0.4054\lambda - 0.0002\lambda^2 - 0.000001\lambda^3$

3.57 mM: $1206 - 5.74\lambda + 0.0093\lambda^2 - 0.000005\lambda^3$

5.36 mM: $2162.1 - 10.004\lambda + 0.0156\lambda^2 - 0.000008\lambda^3$

Supplementary Figures:

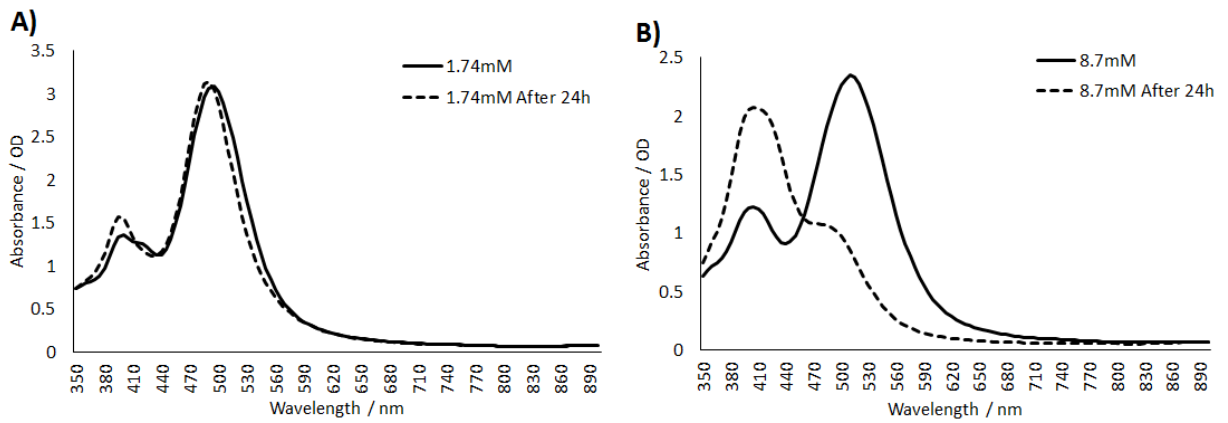

Figure S1. Representative un-normalized spectra of stable (A) and unstable (B) nanoprisms right after (solid line) and 24 hours after (dashed line) the synthesis. The spectra were measured at a 1:3 dilution in diH_2O.

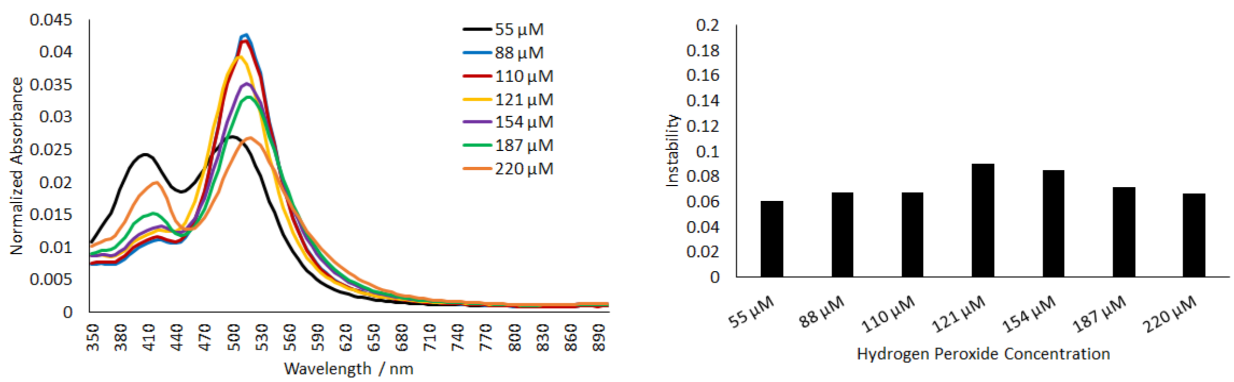

Figure S2. Effect of hydrogen peroxide on nanoprism spectra and stability. Ideal nanoprism growth (sharper peaks and reduced 400nm secondary peak) was found to occur with H_2O_2 concentrations ranging from 88 - 121µM in the seed stock preparation. No effect on stability was observed.

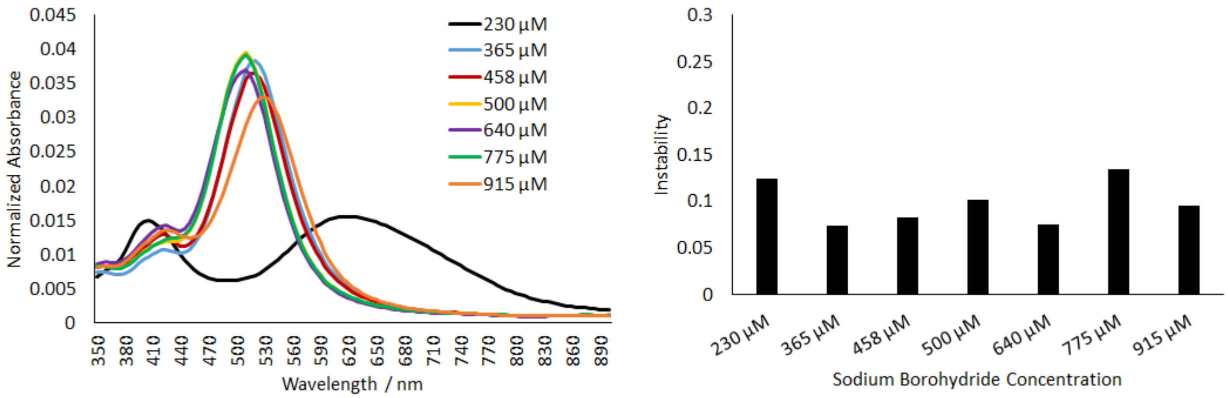

Figure S3. Effect of sodium borohydride on absorbance spectra and stability of nanoprisms. $NaBH_4$ concentrations above ~250 µM were required for ideal nanoprism growth. No effect on stability was observed.

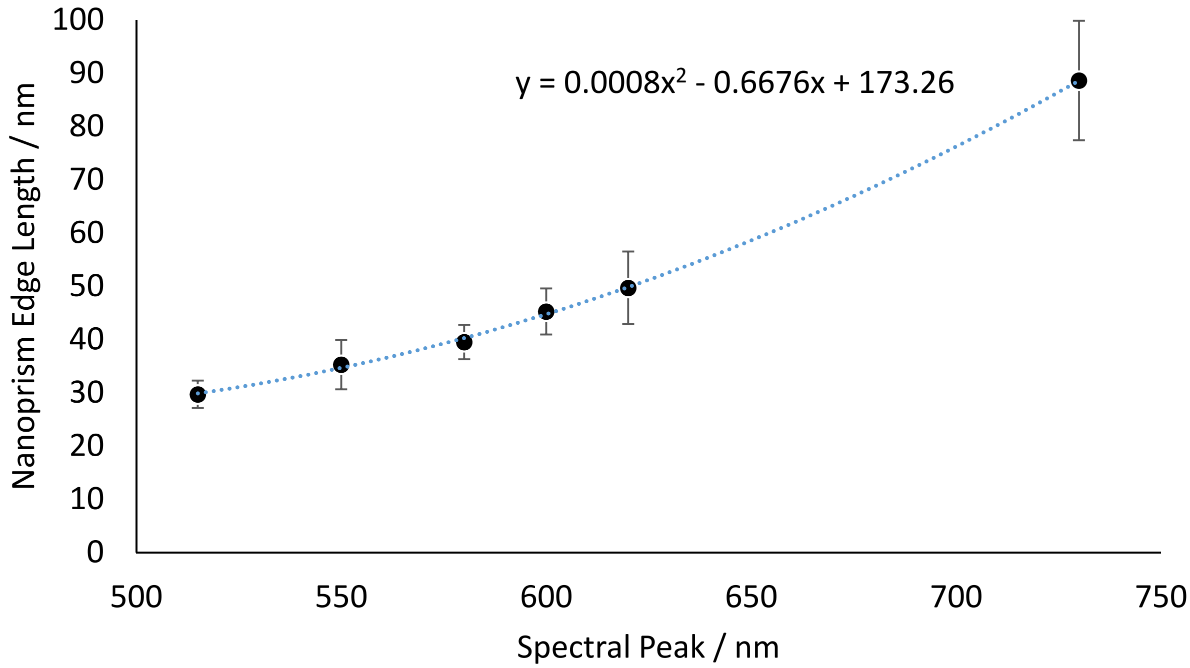

Figure S4. Nanoprism size analysis based on TEM results. TEM images taken for nanoprism suspensions with spectral absorbance peaks at 515, 550, 580, 600, 620 and 730nm were analyzed to determine average nanoprism edge lengths. As nanoprism size increases, spectral absorbance peak redshifts. These measurements were used to estimate nanoprism size based on absorbance spectra of colloidal suspensions.

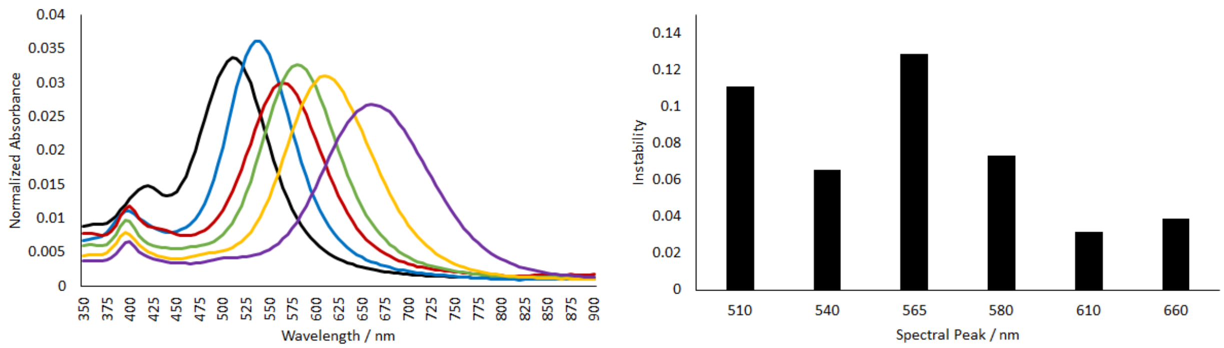

Figure S5. Demonstration of one-pot synthesis of silver nanoprisms using freshly prepared seed solution and low ascorbic acid concentration (0.435mM). Nanoprism solutions with different absorbance peaks prepared using varying quantities of silver nitrate and seed solution dilution factors. At this concentration of ascorbic acid, fresh seed stock showed no loss in stability as compared to aged seed stock, allowing for one-pot synthesis.

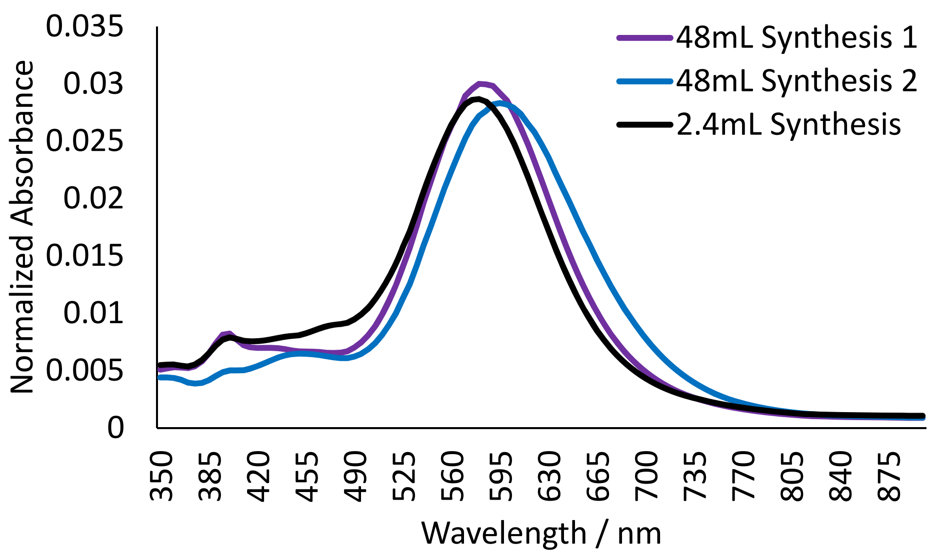

Figure S6. Comparative absorbance spectra of nanoprisms prepared from fresh seeds using larger synthesis volume. Minute differences were observed between nanoprism solutions prepared using low and high volume syntheses. Volumes larger than 48mL were not tested.