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Title: "Nucleotide-Mediated Size Fractionation of Gold Nanoparticles in Aqueous Solutions"

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1. Example for CSC determination. (20 nm and 40 nm Au-nps)

The critical salt concentration (CSC) of Au-nps in certain size is determined as the salt concentration leading to a significant increase in the relative absorbance of A_{650nm}/A_{520nm}. To determine the CSC value, the relative absorbance of A_{650nm}/A_{520nm} was first recorded for every 0.025 M increment of the NaCl concentration for both 20 nm and 40 nm Au-nps solutions, as shown in Figure S1 (a). Then the increment of the relative absorbance for each salt concentration was plot again in Figure S1 (b) to indicate the change of slope of (a), which is the difference in relative absorbance of two close salt concentrations. From the data, we set 0.1 in the difference of relative absorbance as the threshold to define a significant increase in A_{650nm}/A_{520nm}, as illustrated in Figure S1 (b). Therefore, the corresponding salt concentration is determined as the CSC.

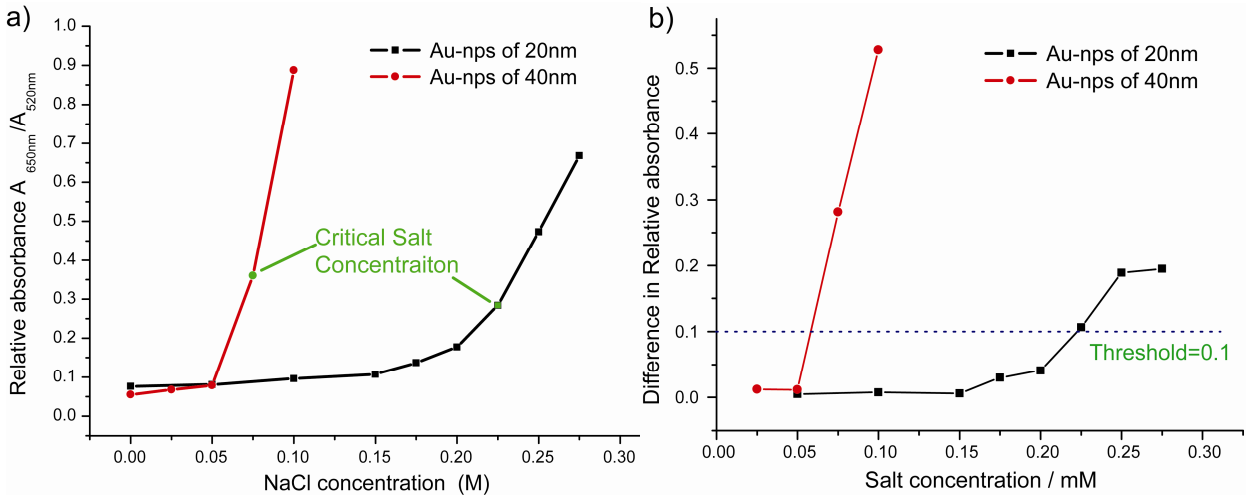

Figure S1. Critical Salt Concentration (CSC) determination. (a) The relative absorbance of A_{650nm}/A_{520nm} for both 20 nm and 40 nm Au-nps in different salt concentrations. (b) The difference in relative absorbance between each salt concentration and the one with 0.025 M lower. The CSCs (Green Dot) for Au-nps of 20nm (Black, Square) and 40nm (Red, Circle) are 0.225 M and 0.075 M respectively.

2. Influence of the amount of A_5 on the stability of 40 nm Au-nps.

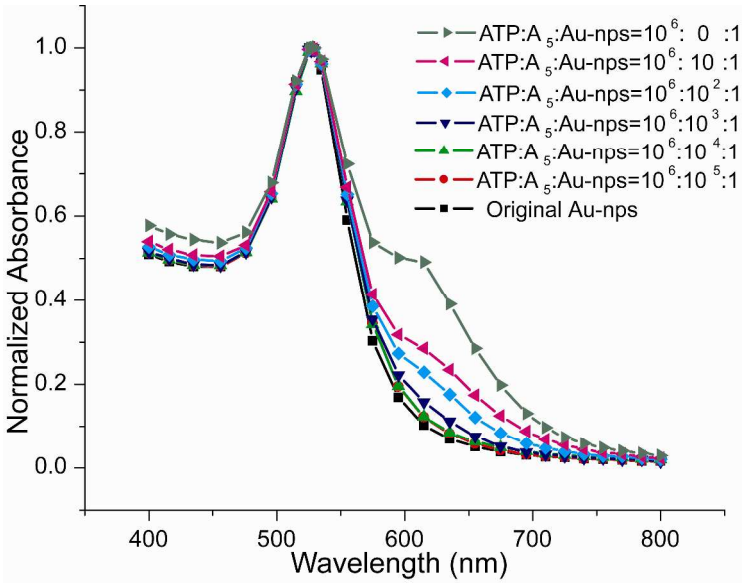

Figure S2. Normalized UV-vis spectra of re-dispersed 40nm Au-nps coated with ATP and A_5. The molar ratio of ATP/Au-nps was fixed at 10^6/1; while the molar ratio of A_5 to Au-nps was varied: 0 (Dark Green, Right-side Triangle); 10 (Purple, Left-side Triangle); 10^2 (Light Blue, Diamond); 10^3 (Dark Blue, Downright Triangle); 10^4 (Light Green, Upright Triangle); 10^5 (Red, Circle). Spectrum of original Au-nps (Black, Square) was also shown as reference.

3. Influence of the molar ratio of ATP to A_5 on Critical Salt Concentrations (CSC).

Table S1. Critical Salt Concentrations of Au-nps protected with ATP/A_5 in different molar ratios.

ATP:A_5:Au-nps	$10^6/10^3/1$	$10^6/10^4/1$	$10^6/10^5/1$	$10^4/10^4/1$	$10^5/10^4/1$
CSC of 20 nm / M	0.2	0.2-0.225	0.15-0.175	0.2	0.225
CSC of 40 nm / M	0.075	0.075	0.075	0.075	0.075

4. Influence of the molar ratio of ATP and A5 to Au-nps on CSC difference between 20 nm and 40 nm Au-nps.

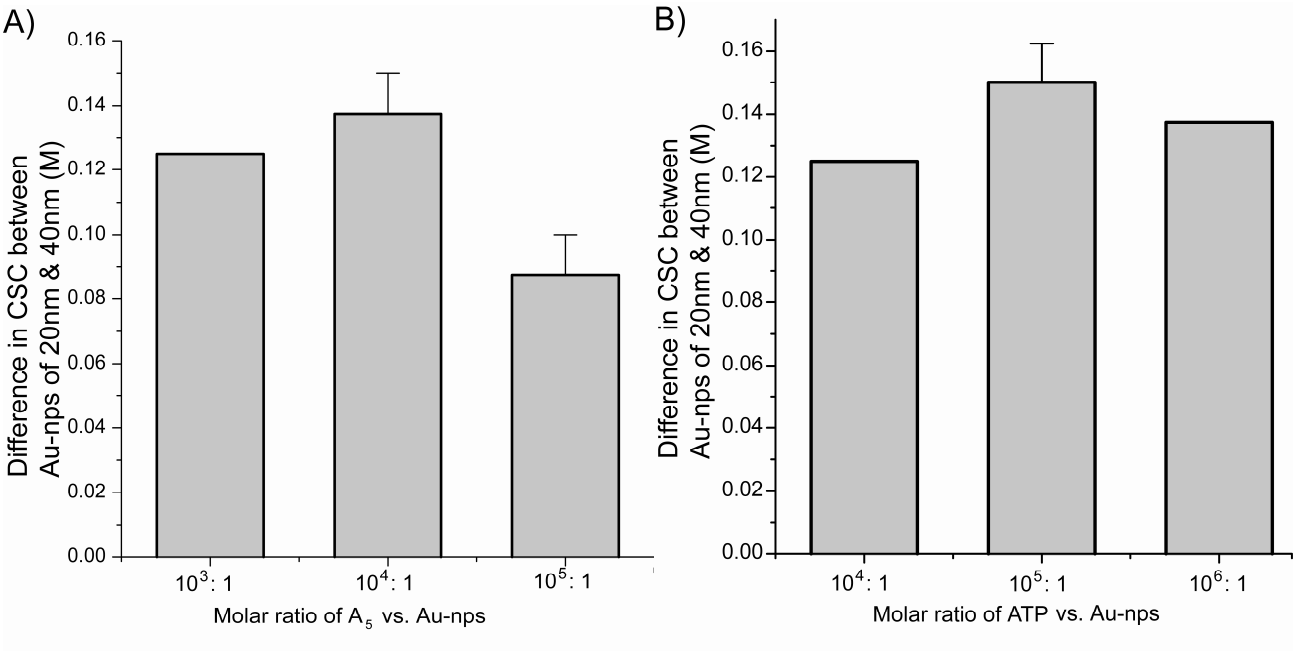

Figure S3. Difference in CSC between Au-nps of 20nm&40nm when protected by different molar ratios of ATP and A_5. A) Molar ratio of A_5 to Au-nps changed while the ratio of ATP to Au-nps was fixed at $10^6/1$. B) Molar ratio of ATP to Au-nps changed while the ratio of A_5 to Au-nps was fixed at $10^4/1$.