Supporting Information

Title Experimental and Theoretical Studies on Sustainable Synthesis of Gold Sol Displaying Dichroic Effect

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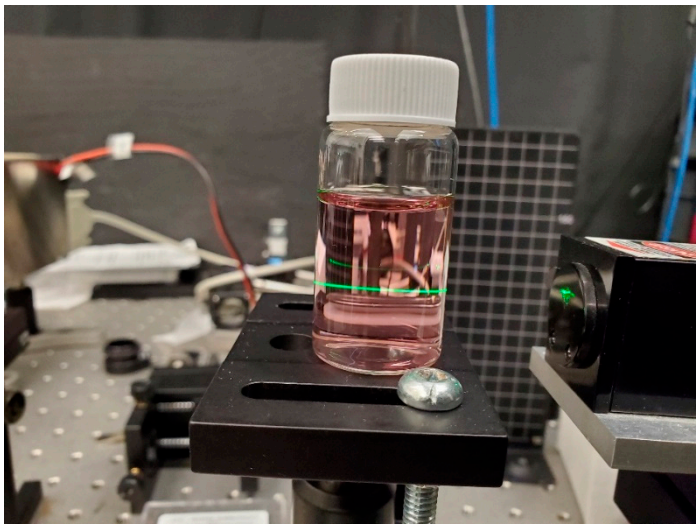

Figure S1. Tyndel effect in small ≤5 nm gold nanoparticles.

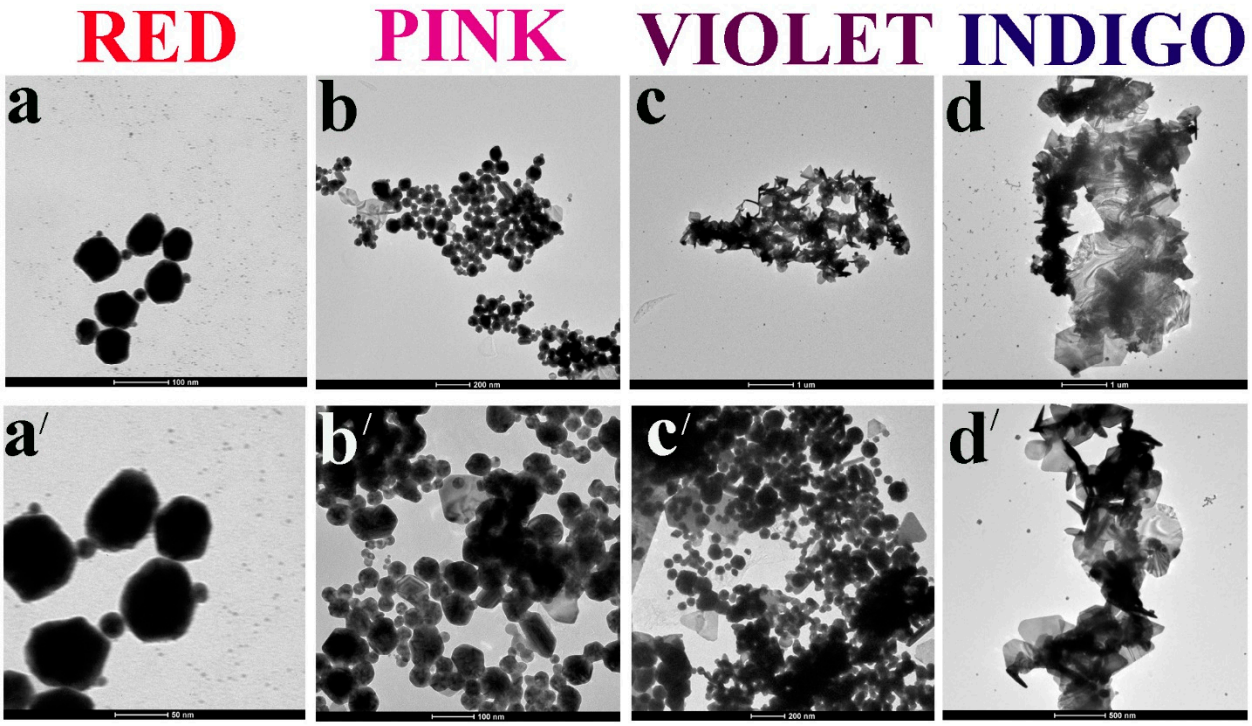

Figure S2. TEM images of four different types of dichroic sol (**a**, **a**') Red, (**b**, **b**') Pink, (**c**, **c**') Violet, (**d**, **d**') Indigo. The red sol also had small ~5-10 nm particles besides big faceted particles.

Table S1. Dominant molecular structures of citrate and aurate as function of pH.

pH	Dominant structure of citrate	Dominant structure of aurate
< 3.1	$C_6H_8O_7$	$AuCl_4^-$
3.1 – 4.8	$C_6H_7O_7^-$	$AuCl_4^-$
4.8 – 5.4	$C_6H_6O_7^{2-}$	$AuCl_4^-$
5.4 – 6.4	$C_6H_6O_7^{2-}$	$AuCl_3(OH)^-$
6.4 – 7.5	$C_6H_5O_7^{3-}$	$AuCl_2(OH)_2^-$
7.5 – 8.3	$C_6H_5O_7^{3-}$	$AuCl(OH)_3^-$
> 8.3	$C_6H_5O_7^{3-}$	$Au(OH)_4^-$

Table S2. pK_a of citrate acid-base equilibria.

Equilibrium	pK_a
$H_3C_6H_5O_7 = H^+ + H_2C_6H_5O_7^-$	3.14
$H_2C_6H_5O_7^- = H^+ + HC_6H_5O_7^{2-}$	4.76
$H_3C_6H_5O_7 = H^+ + C_6H_5O_7^{3-}$	6.40

Table S3. Molecular ratios.

Molecular Ratio (R)	pH stock trisodium citrate	pH stock chloroauric acid
0.97	8.003	2.41