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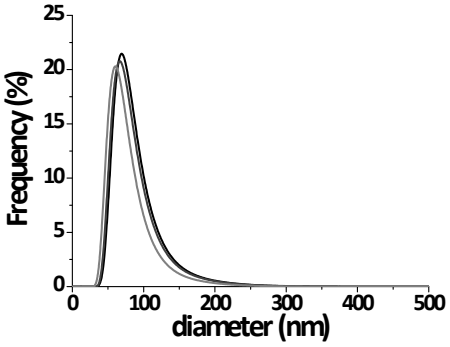
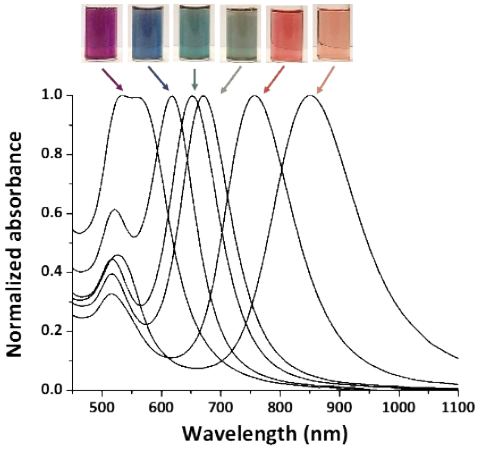
Supplementary information

Dynamic light scattering (DLS) measurements were performed on all synthesized samples used in the study. The hydrodynamic diameter provided by DLS gives a reasonable estimate for the geometric mean length of the nanorods. As an example, repeated DLS curves for the entity with AR= 4.57 are shown below.



In addition to DLS, UV-Vis absorption measurements were also performed on all synthetic samples. The UV-Vis spectra and corresponding photos are included below.



Aspect ratios for the particles were calculated based on the work of S. Link et al. (*J. Phys. Chem. B.* 109 (2005) 10531-10532), by the following formula (λ_{max} is the location of the second plasmon band, ε_m is 1.77 for water):

$$AR = \frac{\lambda_{max} - 495.14}{53.71 * \varepsilon_m} + 0.79$$

Plasmon peaks		
λ_1 (nm)	λ_2 (nm)	Aspect ratio by UV-Vis
535	560	1.47
520	600	1.89
515	650	2.41
515	670	2.62
515	755	3.52
530	850	4.52

It is also worth mentioning that plasmon peaks in the UV-Vis spectra are corresponding to a large number of particles (they are strongly averaging features) and the peak location can only be determined with a few % accuracy at best. Also, the peaks do not directly give information about the particle width or length, only about the aspect ratio.