Supporting Information

Polarization properties of fluorescent BSA protected Au_{25} nanoclusters

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A. Rayleigh Scattering Fitting Information. We were measuring extinction of light as it travels through the cuvette. In our approach we assumed the extinction of the incoming beam is a linear composition of physical light absorption by particles and out-scattering of light by large colloidal particles. The loss of light due to scattering is proportional to the Rayleigh scattering cross-section that is given by:

$$\sigma_s = \frac{2\pi^5}{3}\frac{d^6}{\lambda^4}\left(\frac{n^2-1}{n^2+2}\right)^2$$

Where d is the particle size and n is the apparent refractive index of the particle. In general the refractive index should be considered as a wavelength dependent parameter. However, the refractive index of colloidal particle is very difficult (impossible) to measure. We assumed that it is comparable to the refractive index of protein and only slightly higher than refractive index of water. So, in our approximation we kept refractive index as constant parameter and rolled it into one overall constant parameter, C as:

$$\sigma_s = \frac{C}{\lambda^4}$$

The constant C is also averaged for the particles (clusters) size distribution. To fit the data we measured the extinction up to 900 nm. In such a case the range from 700 nm to 900 nm is completely free from cluster absorption and can be used to fit the parameter C. Since the detector detects the amount of transmitted light the loss of light can be expressed as:

$$\Delta I(\lambda) = I_0(\lambda)\left(1-\frac{1}{10^{A(\lambda)}}\right)$$

Where $I_0(\lambda)$ is the corrected incoming light intensity at given wavelength; $A(\lambda)$ is measured absorbance at given wavelength. The range free from light absorption by cluster (700 nm-900 nm) can be fitted to Rayleigh scattering. In Figure x we are presenting the expanded fit. The fit is excellent in entire 200 nm range. This means the deviation due to the refractive index change and size distribution are rather small. The fitted parameter C is then used for entire range to approximate the Rayleigh scattering component. For this particular case the fitted parameter C = 6.64x 10^9 for wavelength measured in nm.

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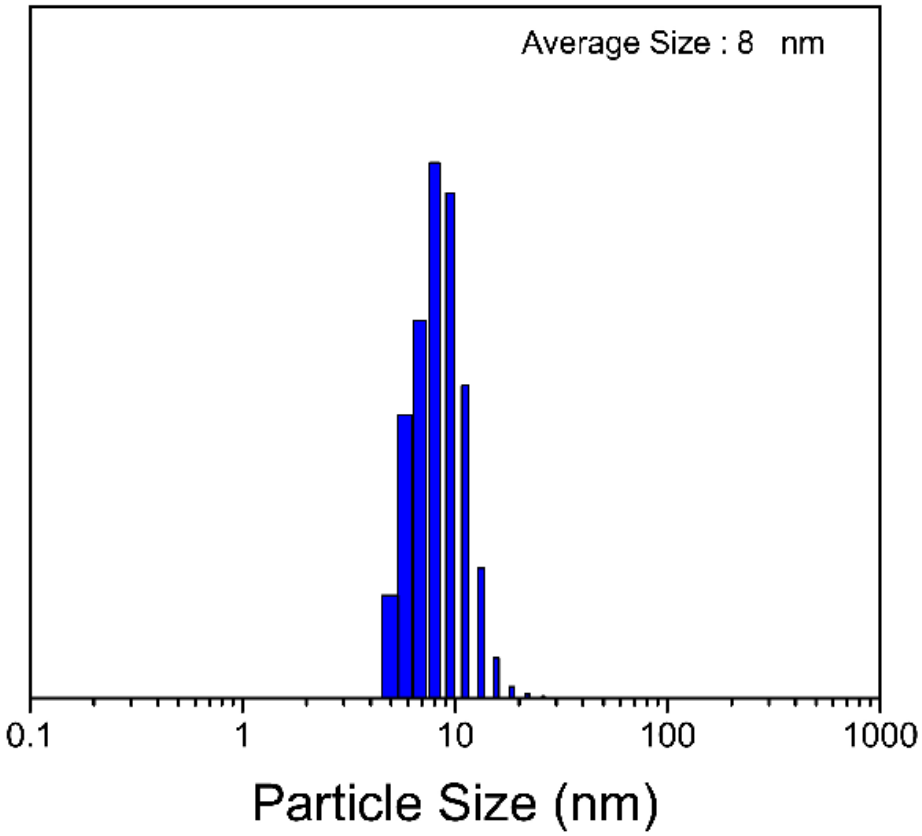
B. Hydrodynamic Particle Size

Hydrodynamic particle size histogram measured using dynamic light scattering of diluted sample of BSA Au_{25} clusters.



C. Fluorescence lifetime decay component and respective amplitudes of BSA Au_{25} clusters

1). 1.88 μs (40.75%),

2). 0.44 μs (19.27 %)

3). 0.009 μs (39.98 %).