Claudia Y Lee and Enrico Gratton.
Fluctuation correlation spectroscopy with colloidal gold particles.
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Abstract
Fluctuation correlation spectroscopy (FCS), or, fluorescence correlation spectroscopy, was initially inspired by experiments counting free-floating gold particles passing through the focal volume of a microscope. Gold particles are still frequently used in biological applications for their easily manipulated chemistry, but rarely are FCS techniques applied to gold beads. We discuss the difference in fluctuation experiments between fluorescent probes and plasmon resonance from gold particles.

We observed the intensity fluctuation due to plasmon resonance of diffusing spherical, colloidal gold nano-particles and compared it with the fluctuation obtained with common fluorescent probes. A 543.5nm He-Ne laser was used both to excite the fluorescent probes and to illuminate the gold particles, so that the illumination volume was identical. We changed the dichroic of the standard confocal microscopy system with a beam splitter to observe the plasmon resonance signal from the gold particles. The auto-correlation curves obtained form the fluctuation correlation experiment showed unexpected behavior of the correlation times and PCH distribution for the plasmon resonant gold particles than for the fluorescent probes, assuming a nominal size for the gold particle as specified by the manufacturer. We are systematically investigating the origin of this discrepancy. One possibility is that the focus of the fluorescence and of the scattering volume observed is not identical. Another effect could be related to deformation of the PSF due to the very high instantaneous intensity of the gold particle that transiently saturate the detector. The state of aggregation of the gold particles could also be responsible for part of ... [truncated at 250 words]