Supplementary Material (ESI) for *Nanoscale*

Biocompatible Glutathione Capped Gold Clusters as One- and Two-photon Excitation Fluorescence Contrast Agents for Live Cells Imaging

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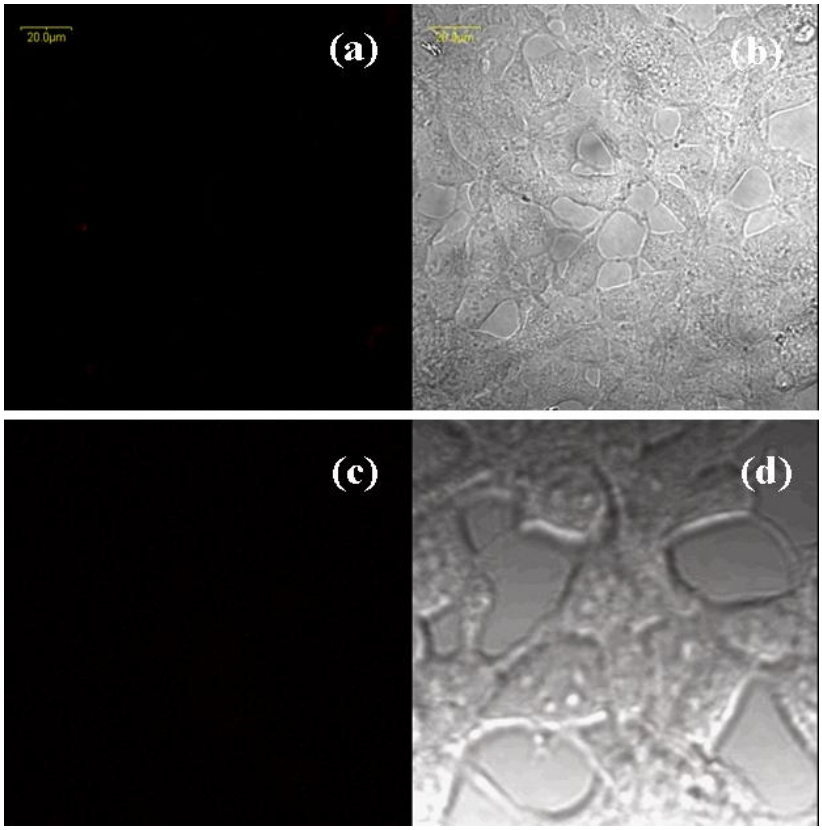
Control experiments:



S1. One-photon (a) and two-photon (c) excitation fluorescence images of SH-SY5Y neuroblastoma cells without the incumbated of gold clusters**.** The excitation wavelength is 633 nm. The images on the right (b&d) are the overlaid pictures of the fluorescence images and the corresponding differential interference contrast (DIC) images.

Blinking studies of gold clusters:

We have recorded total fluorescence intensity traces of gold clusters in solution phase over time on an Olympus FV300 inverted confocal microscope using 633 nm He-Ne

laser (Melles Griot, Singapore) as excitation source. The fluorescence signal was then collected by the same objective and detected by the photomultiplier tube (PMT) with a time resolution of 50 ns. The CdTe quantum dots (QD-655) was excited by using 488nm Ar ion laser of the same power at the sample.

Single particle fluorescence is the ideal way to study photo-blinking properties. However, we have noticed that the single gold cluster is not as bright as single QD particle. Here we monitored their photo blinking behavior using an approximate way in our experiment. We have used higher cluster concentration to achieve an overall similar intensity to that of QD. The results show that the overall fluorescence intensity coming out of the detection volume is not altered noticeably. In contrast, QD showed significant blinking behavior. The results suggest that the gold clusters show significantly reduced blinking behavior compared to QD.

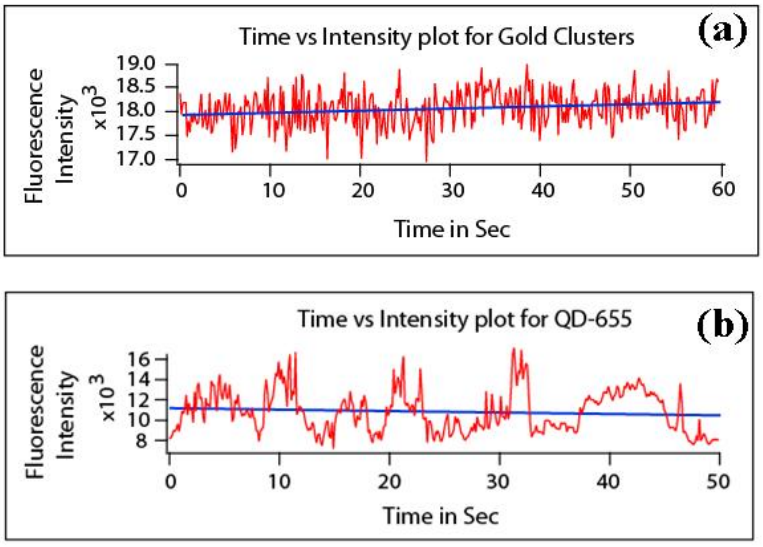


Figure S2. The fluorescence intensity traces of gold clusters and CdTe quantum dots (QD-655) versus their laser irradiation time under one-photon excitation conditions.