

Unlabelled Confocal Microscopy Imaging of 15 to 150 nm Gold Nanoparticles

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Noble metal nanoparticles (NPs), particularly gold (Au) and silver (Ag) NPs, have recognized relevance in chemistry, physics, and biology because of their outstanding optical, electrical, and photothermal properties. Optical properties, as UV-vis spectra and localized surface plasmon resonance, are easily measurable signatures indicative of their morphology (size and shape), composition, surface chemistry, aggregation state and physical environment that can be used to identify molecular targets and chemical transformation processes.¹ Due to the growing interest in the use of metal NPs in medicine and biology, detailed cellular studies are required before their application *in vivo* for treatment or diagnostic purposes.² Herein, we present the observation of unlabelled Au NPs on Confocal Laser Scanning Microscopy (CLSM), by using the light reflectance instead of the commonly used fluorescence mode. The NPs size resolution limits for CLSM observation is studied experimentally. Theoretical calculations, of the size-dependent optical properties are also presented to support this argument. The Au NPs used were synthesized using the seeded growth citrate reduction method³, and the NPs sizes range from 15nm to 150nm. Full characterization of the produced NPs was also performed by Transmission Electron Microscopy (TEM), UV-Vis spectroscopy and Dynamic Light Scattering (DLS). Further, the intracellular observation of different sizes of Au NPs using the reflectance mode is also presented. This work reveals as a method to observe NPs in living systems in real-time and non-invasive way, which can be extended to other inorganic NPs.

References

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Figures

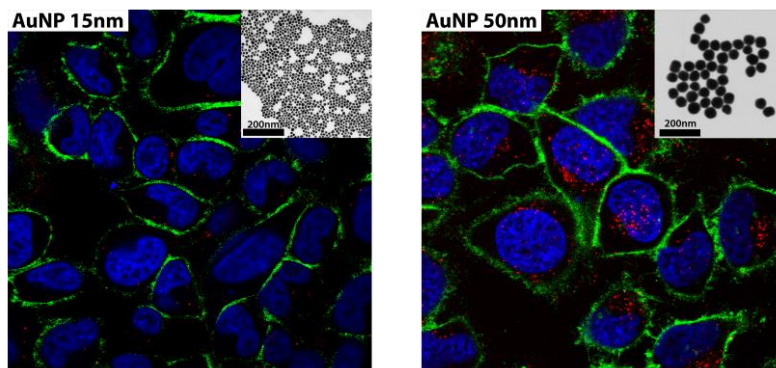


Figure 1: Confocal Imaging of Au NPs, 15nm (left) and 50nm (right), on *in vivo* HeLa cells