

QUANTITATIVE DARK-FIELD MICROSCOPY OF GOLD NANOSHELLS IN CELLS

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Gold nanoshells are biologically inert nanoparticles with unique optical properties. Biological molecules can be affixed to the exterior of gold nanoshells and thus transported into cells. Upon laser irradiation, the affixed molecules can be controllably released. This technique allows for the transport and controlled delivery of a variety of therapeutic molecules, such as DNA and proteins, and thus holds possibility for a variety of medical applications in disease treatment. However, the number of therapeutic molecules delivered depends upon the number of gold nanoshells that can be placed in cells, and this quantity remains unknown. We have constructed a transmission dark-field microscope for imaging and quantifying the number of nanoshells taken up within individual cells. Controlled by a custom-written LabView software program, this dark field-microscope collects a series of images which are then processed, resulting in a quantitative estimate of the number of gold nanoshells inside of a cell and a three dimensional representation of their location.