



Optical Observation + Hyperspectral Characterization of Nanomaterials *in-situ*

## Non-fluorescent Nanoparticle Observation in Cells and Tissue

Fluorescent labeling is required to detect the presence of nanoparticles in cells and tissue with most optical microscopy techniques. However, the CytoViva Hyperspectral Microscope system enables researchers to optically observe and spectrally characterize nanomaterials in these environments without the need for fluorescent labels. With CytoViva's patented, high signal-to-noise darkfield-based microscopy optics, the light scatter from these nanoparticles and their targeted environment is easily observed. Noble metal or liposome nanoparticles, carbon nanotubes and metal oxides are examples of materials that can be optically imaged and spectrally analyzed with the CytoViva Hyperspectral Microscope system.

The following images of gold nanoparticles (AuNPs) in cells represents one example of this capability. The inert nature of AuNPs, combined with their plasmon resonance properties, provide many potential benefits as biosensors and drug delivery vectors. Therefore it is important to observe the interaction between these AuNP constructs and live cell cultures *in-vitro*.

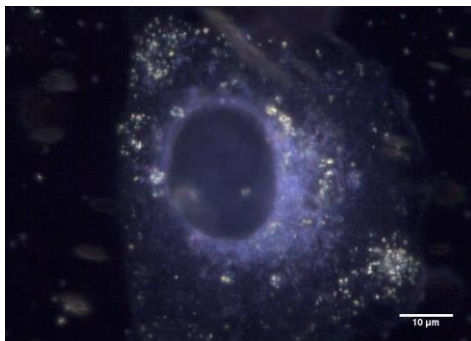


Figure 1. Epithelial Cell Incubated with AuNPs

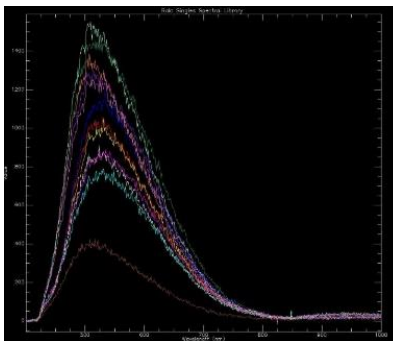


Figure 2. Spectral Library Created from AuNPs

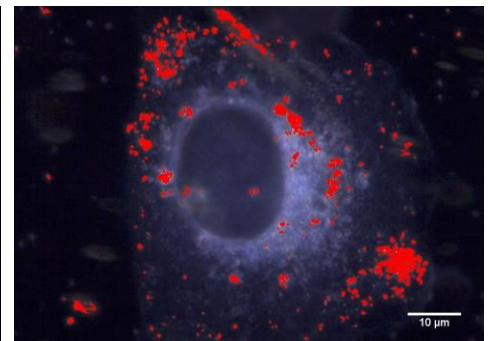


Figure 3. Red Maps the Location of AuNPs in Cell Structure

With the CytoViva Hyperspectral Microscope system, a hyperspectral image of non-fluorescent AuNPs in an epithelial cell is created (Figure 1). Figure 2 is a reference spectral library that has been collected from known AuNPs. The spectral mapping algorithm, contained in the spectral imaging software, compares all pixels in the image of the epithelial cell (Figure 1) to all the previously recorded AuNP spectra in the reference library (Figure 2). Each pixel in the epithelial cell image that matches the AuNP spectra is mapped in red. The location of the red pixels spectrally confirms the presence and location of AuNPs in the cells as shown in Figure 3.

The CytoViva Hyperspectral Microscope system enables these non-fluorescent nanoparticles to be spectrally characterized and mapped in their targeted environment. This serves to quantify their presence based upon their unique spectral response. As a result, researchers can better understand the interaction between nanoparticles and cells without the use of fluorescent labels.

### More Information

More Information at [www.cytoviva.com](http://www.cytoviva.com), , or   
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