

Au Nanorod Identification in Tissue: Enhanced Darkfield Hyperspectral Microscopy

Au nanorods are studied extensively for use as biosensors, drug delivery vectors and in theranostic therapy. A key element in determining the efficacy of these nanorods is the ability to quickly and accurately assess how well they are delivered to their intended tissue target areas in-vivo.

CytoViva's Enhanced Darkfield Hyperspectral Microscope is used extensively to determine where Au nanorods are localized in ex-vivo tissue samples. Not only is it possible to observe the nanorods in the tissue using the CytoViva technique, their unique spectral response can also be identified and mapped in the tissue sample. These sample images can be captured and spectrally analyzed in minutes, making it much more efficient than other techniques such as electron microscopy.

The aspect ratio of the Au nanorods will determine their unique "twin peak" longitudinal and transverse spectral response. These aspect ratios often produce spectral peaks from 500nm up to 1,700nm in the short wave near infrared range. This broad range of spectral response can produce many beneficial effects depending on the intended therapy and the targeted tissue.

CytoViva's Hyperspectral Microscope supports the ability to create hyperspectral images to optically observe and spectrally confirm the presence and location of Au nanorods within a spectral response range of 400nm -1,700 nm.

See below (figure 1) an enhanced darkfield hyperspectral image of Au nanorods in mouse tissue. The nanorods appear as green or red in the image. Figure 2 illustrates the spectral response of one of the nanorods with a peak at 900nm along with the spectral response of the tissue. Figure 3 and Figure 4 illustrate Au nanorods on a glass slide and demonstrate the ability to detect the spectral peak of a single nanorod at approximately 1,200nm.

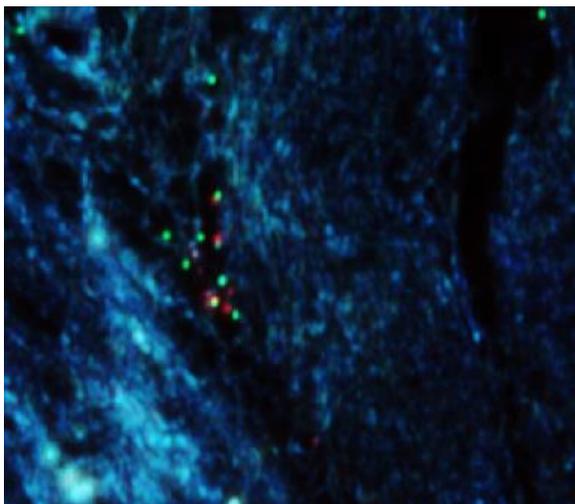


Figure 1: 60x hyperspectral image plus 4x digital zoom of Au nanorods in tissue

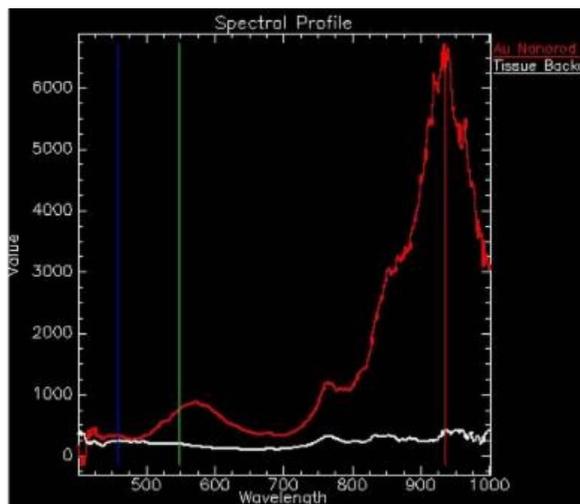


Figure 2: Au nanorod 900nm peak spectral response (red) and tissue background spectral response (white)

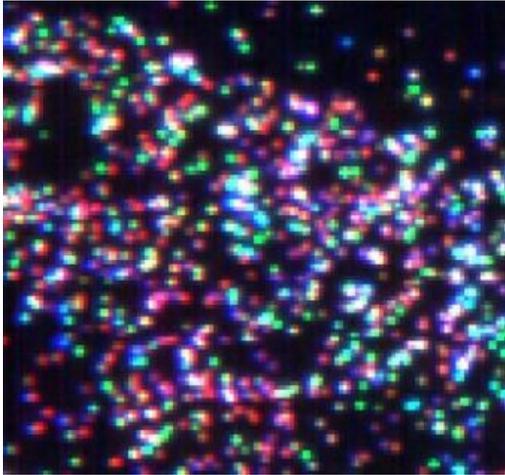


Figure 3: 50x hyperspectral image plus 4x digital zoom of Au nanorods on a glass slide

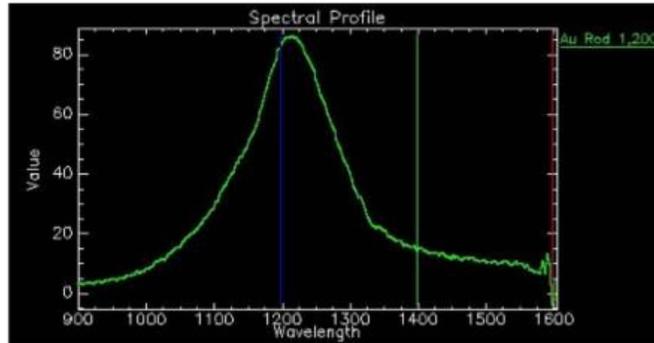


Figure 4: Au nanorod 1,200nm peak spectral response

More Information

To learn more about CytoViva's Enhanced Darkfield Hyperspectral Microscope and its ability to enable rapid observation of Au nanorods and other nanomaterials in tissue and related matrices, please go to www.cytoviva.com. Also, you can contact CytoViva directly at info@cytoviva.com to discuss test imaging of your samples or to learn more about the technique for your research group.

See below an open access publication demonstrating this capability in more detail:

<http://link.springer.com/article/10.1007/s40820-014-0025-1#page-1>