

Evaluating Nanorod Characteristics

Nanorods are nanoscale objects synthesized from semiconducting or metallic materials. Nanorods can be used in non-biological applications such as light emitting devices, microelectromechanical systems and as sources of near ultraviolet radiation. Biological applications include targeted drug delivery and infrared light triggered apoptosis.

The CytoViva Hyperspectral Microscope System can optically image and spectrally detect nanorods in a wide range of biological and non-biological matrices.

In this example, gold nanorods (AuNRs) were synthesized in two different aspect ratios and then arranged in a grid pattern onto a silicon substrate. Figure 1 is a hyperspectral image of AuNRs with an aspect ratio of three on a silicon substrate. The color of the spectral responses in Figure 2 correlate to the colored pixels in Figure 1. The red curve in Figure 2 shows the primary response of the AuNRs to be 610nm.

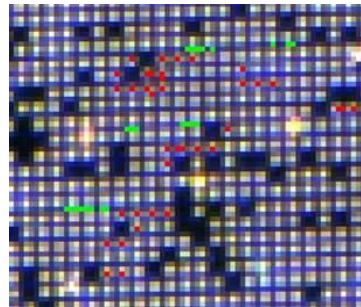


Figure 1: AuNRs on Silicon

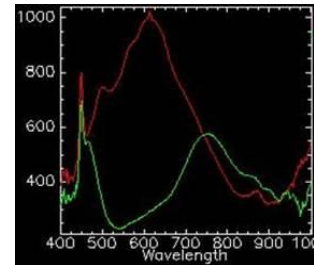


Figure 2: Spectral Response of AuNR (red) and Silicon (green)

Figure 3 is a hyperspectral image of AuNRs with an aspect ratio of 6 on a silicon substrate. The color of the spectral responses in Figure 4 correlate to the colored pixels in Figure 3. The red curve in Figure 4 shows the primary response of the AuNRs to be 560nm. The green response in both Figure 2 and 4 shows the characteristics of the silicon background. The CytoViva Hyperspectral Microscope system can distinguish nanorods based on the aspect ratio characteristics.

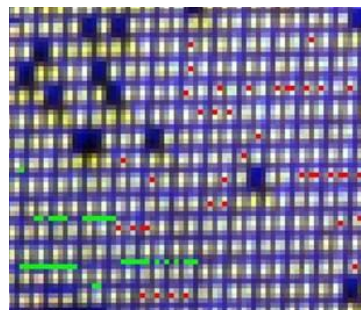


Figure 3: AuNRs on Silicon

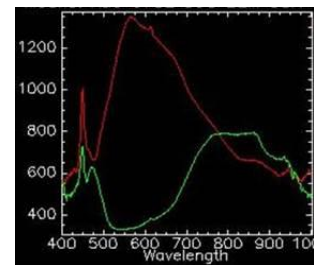


Figure 4: Spectral Response of AuNR (red) and Silicon (green)

The CytoViva Hyperspectral Microscope System can spectrally determine the coating on a nanorod. Figure 5 is a hyperspectral image of a coated silicon nanorod that has been developed as a cancer therapeutic. Figure 6 shows the spectral response of the nanorod in red and the spectral response of the coating in white.



Figure 5: Coated Silicon Nanorod

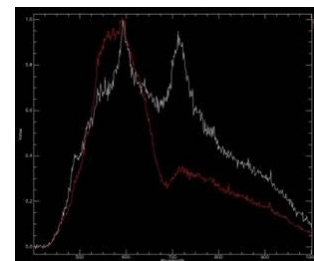


Figure 6: Spectral Response of Silicon Nanorod (red) and Coating (white)

The CytoViva Hyperspectral Microscope System can spectrally determine the characteristics of nanorods in an array of environments. The hyperspectral capability can illustrate the photonic action of nanorods from the VNIR to the SWIR ranges.

More Information

To read the published abstract please visit:

<http://www.sciencedirect.com/science/article/pii/S0928493113003561>

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