Differentiating Aggregating and Non-Aggregating AgNPs

Silver nanoparticles (AgNPs) are known for their antimicrobial properties and are now used extensively in bandages, clothing and other materials to inhibit the growth of bacteria and viruses. Effective dispersion of AgNPs is often required to maximize these antimicrobial properties, or other electrical and thermal properties, when AgNPs are used as biological or chemical sensors. The CytoViva Hyperspectral Microscope System can provide critical data relating to nanoparticle dispersion.

Figure 1 illustrates dispersed AgNPs below 50nm in size, where particle concentration is relatively low and the medium is a buffer solution. This image was captured with the CytoViva Hyperspectral Microscope System. When illuminated with full spectrum light, AgNPs in this size range are typically presented as blue, due to a consistent plasmon resonance effect. The homogenous nature of the particles is also confirmed by the consistent hyperspectral curves collected randomly from individual particles as illustrated in Figure 2.

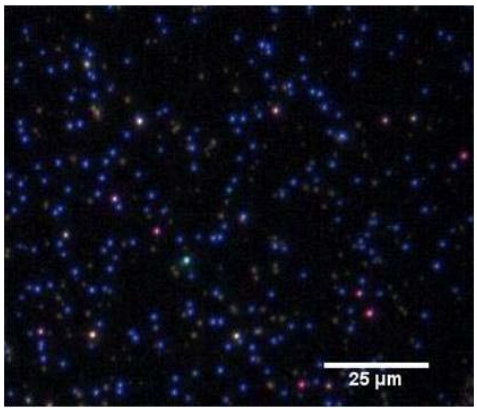

Figure 1. Dispersed AgNPs in Solution

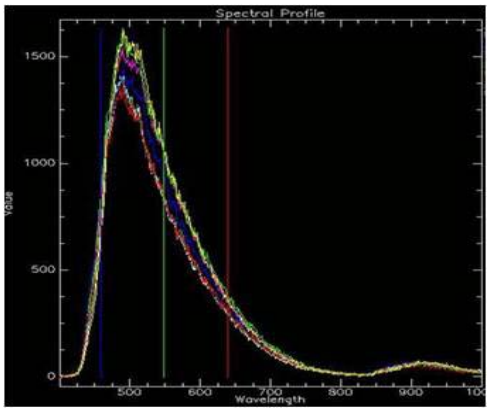

Figure 2. Homogenous Spectral Curves from Individual Dispersed AgNPs

Figure 3 illustrates aggregating AgNPs in water. Note the wide variety of colors that result from red-shifting of the resonance peak as the particles aggregate into larger sizes. Figure 4 confirms this aggregation by illustrating a wide range of spectral responses from the different particles.

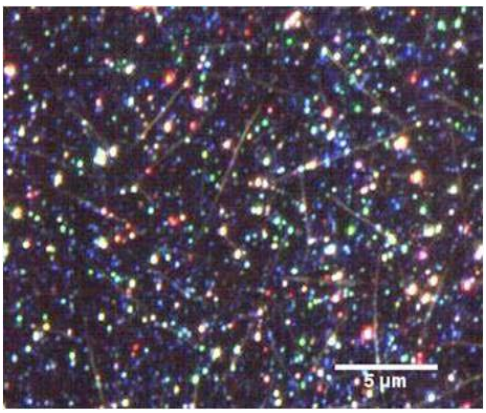

Figure 3. Aggregating AgNPs

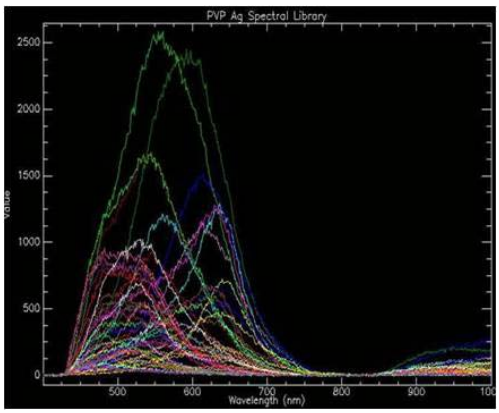

Figure 4. Spectral Library Created from AgNPs

With the CytoViva Hyperspectral Microscope System, both qualitative optical and quantitative hyperspectral data can be acquired to quickly and accurately determine the relative dispersion of nanoparticles in a wide range of environments.

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