

Nanoparticle Tracking In Whole Animal Organisms

Nanomaterials are widely used in many areas including electronics, construction, automotive, consumer goods, and textiles. As these products degrade over their lifetime, nanoparticles (NPs) are released into the environment. Scientists are now researching how these nanomaterials may adversely affect the environment.

Whole animal organisms such as Zebrafish, Daphnia and Xenopus are utilized extensively to model the potential toxicity and other effects of nanoscale materials on the environment and humans. For example, it has been shown that fertility rates of Zebrafish can be significantly reduced when exposed to ZnO that has been released into the environment. When researching the effects of NPs on whole animals, the ability to confirm the presence, location and relative amount of the NPs within the organism is critical.

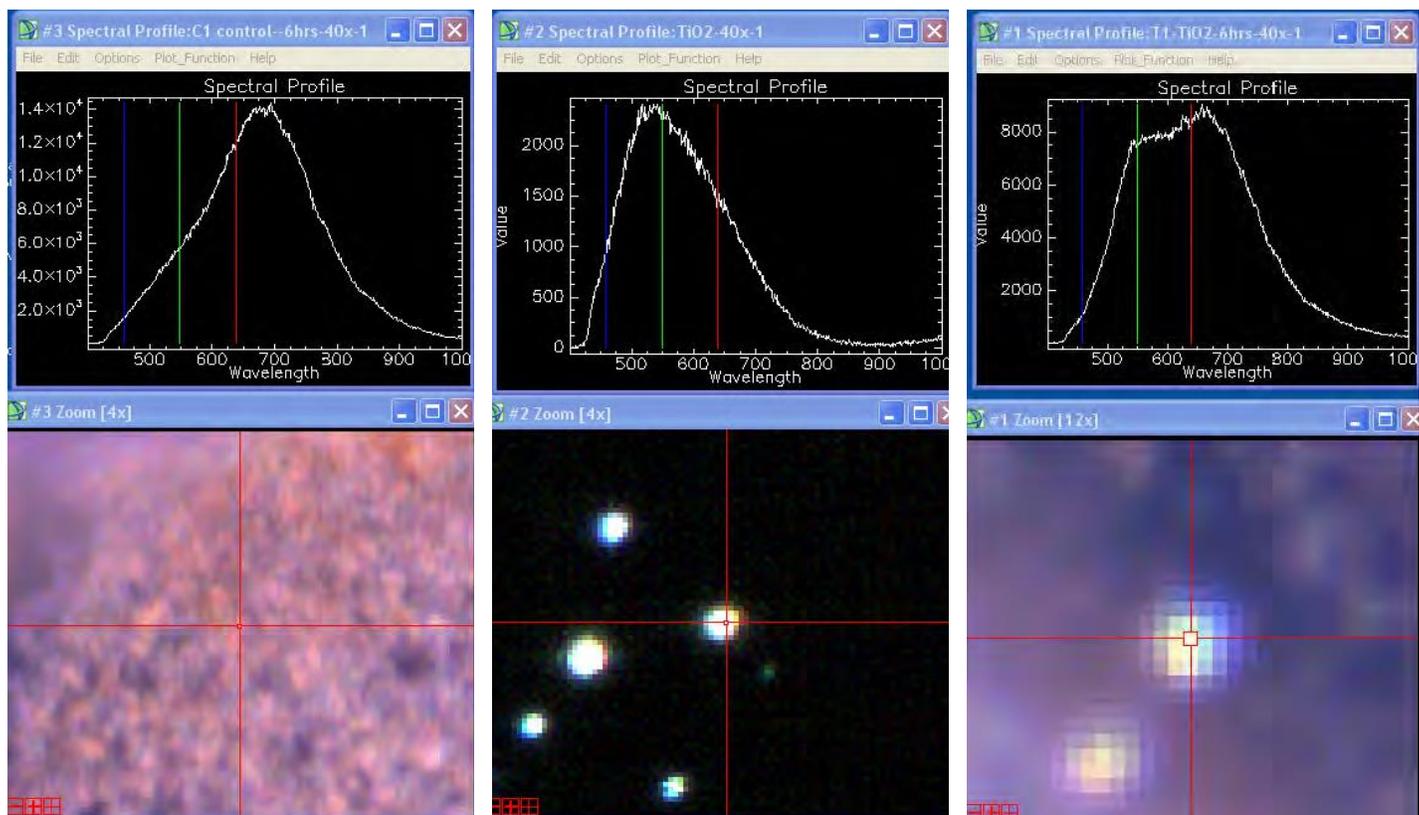


Figure 1: Whole Animal Embryo Control

Figure 2: TiO₂ NPs in Solution

Figure 3: TiO₂ NPs Injected in Whole Animal Embryo

The CytoViva Hyperspectral Microscope system has proven to be a highly effective tool for observing, characterizing and mapping a wide range of NPs exposed to a diverse set of whole animal organisms. NPs that can be observed and mapped in whole animal organisms include, metal oxides and noble metal based materials. CytoViva's patented, enhanced darkfield microscope capability creates a high signal to noise image, which can enable direct observation of nanoparticles internalized by whole animal organism.

Figure 1 illustrates a zoom image of a negative control organism and its representative reflectance spectra. Figure 2 illustrates TiO₂ NPs in solution along with its characteristic spectral response. In figure 3, the spectral response of a TiO₂ NP internalized in the organism is displayed. The spectral response within this pixel clearly exhibits the spectral characteristics of both the organism tissue and the TiO₂ NP.

Using CytoViva technology, scientists can quickly and easily track nanoparticles in whole animal models as they study the potential impact to the environment and humans.