

## Characterizing Functional Groups on Carbon Nanotubes

**Carbon nanotubes (CNTs)** are becoming widely used in industry to increase strength and reduce weight of structural materials. The problem of uniform dispersal of CNTs and weak binding with other structural components is often being solved with functionalized surface chemistries.

**CytoViva's Hyperspectral Microscope System** can be employed to characterize the processing of uncoated and functionalized CNTs.

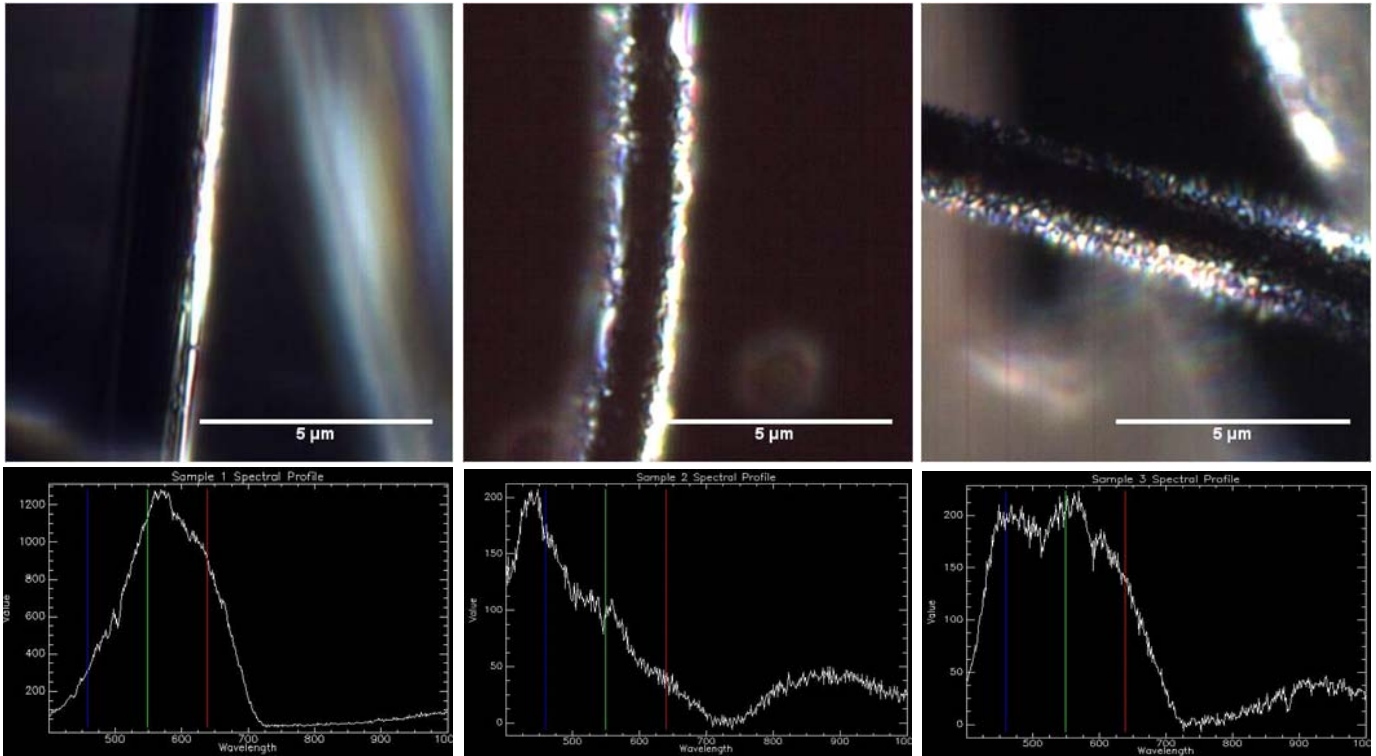


Figure 1. Fiber w/o CNTs

Figure 2. Unfunctionalized CNTs

Figure 3. Functionalized CNTs

Shown above are hyperspectral scanned images and spectral profiles from Toray® carbon fibers with no CNT coating (Figure 1), an unfunctionalized CNT coating (figure 2), and with a functionalized glucose oxidized CNT coating (figure 3). Optical spectra obtained from pixels at the edge of the fiber in each of the scanned images reveal distinct spectral components associated with uncoated and coated CNTs.

**CytoViva's patented dark field illumination system**, which was used to create these images, causes the light to be reflected mostly from the edges of the fibers, thereby enhancing the spectral signatures coming from the CNT coatings. This unique spectral imaging method is being employed as a new tool in research with carbon structures.