Detection and Characterization of Airborne Carbon Nanotubes Captured on Cellulosic Filters

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At the National Institute for Occupational Safety and Health (NIOSH), efforts have been underway to assess the potential impact to workers from exposure to a wide range of nanomaterials. Carbon nanotube (CNT) exposure through inhalation has been a major focus of these initiatives. Part of this effort includes the evaluation of new methods for detecting and characterizing airborne engineered nanomaterials. CytoViva's Hyperspectral Microscope technology is being evaluated to test its efficacy in detecting and characterizing airborne engineered nanomaterials captured onto filters.

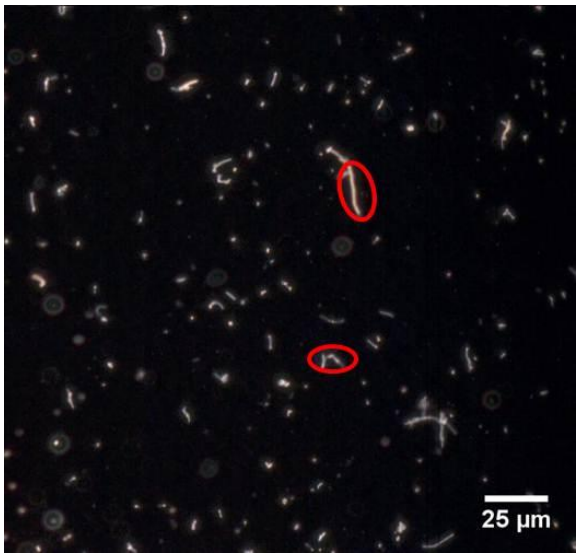

Figure 1

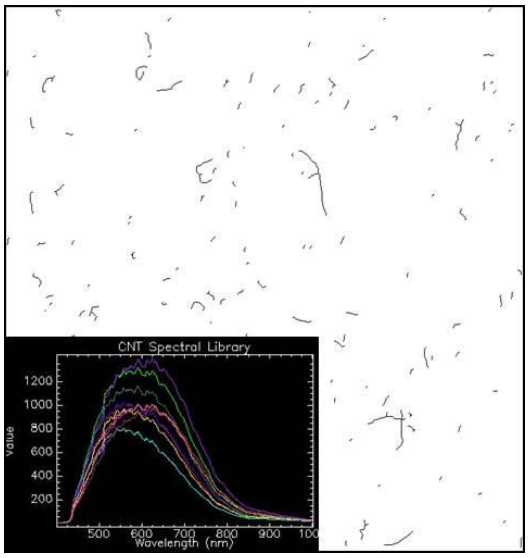

Figure 2

CytoViva's patented enhanced darkfield based microscopy system creates a high signal-to-noise image, which allows for optical observation of airborne nanomaterials trapped in cellulosic filters. The CNTs are imaged after the filter material has been placed on the microscope slide and cleared using a solvent (Figure 1). In this hyperspectral image, strands of CNTs appear bright against a dark background. The CNT reflectance spectrum can be collected from individual pixels of this image. A spectral library (Figure 2 inset) of CNTs was collected from the particles circled in red in Figure 1. This reference library was used to detect the presence of CNTs in filter samples of varied concentrations (0.5, 1.0 and 3.0 ug per filter). Figure 2 illustrates the spectral mapping of the CNTs in black.

Further image analysis was conducted to count spectrally mapped CNTs from each filter sample. The means of these counts showed a linear relationship to the pre-loaded CNT concentrations (Figure 3). The CytoViva Hyperspectral Microscope System can provide a simple and rapid methodology for detection of sampled airborne contaminants to monitor for safe levels in the environment.

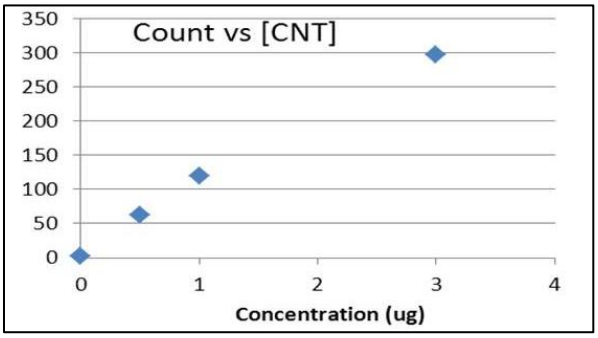

Figure 3

For additional information, please contact CytoViva at info@cytoviva.com.