Airborne Carbon Nanotube (CNT) Detection

The presence of airborne nano-materials in the environment may pose significant safety concerns. Even minute levels of some materials, such as carbon nanotubes (CNT), have been shown to have possible adverse effects on human health. It is a common practice to capture airborne micro and nano scale particles using filter-trapping techniques and then confirm their presence using specialized imaging and analytical tools. Below, we illustrate the ability of CytoViva's hyperspectral microscopy system to confirm the presence of airborne CNTs pulled onto a polycarbonate filter via an air pump. This is accomplished by first capturing images of the exposed filter using CytoViva's hyperspectral microscopy system followed by applying a spectral mapping algorithm based on the CNT spectral response to the image. This enables each pixel in the image containing CNT spectra to be identified, counted and compared to the total filter area.

Figure 1 is a hyperspectral image of a polycarbonate filter (40X magnification) illustrating embedded CNT materials. Figure 2 is a collection of reflectance spectra collected from edges and interiors of the CNTs in easily observable aggregated areas.

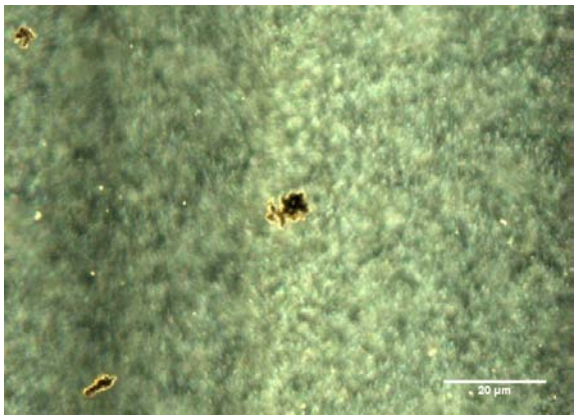

Figure 1. Polycarbonate Filter with Embedded CNTs

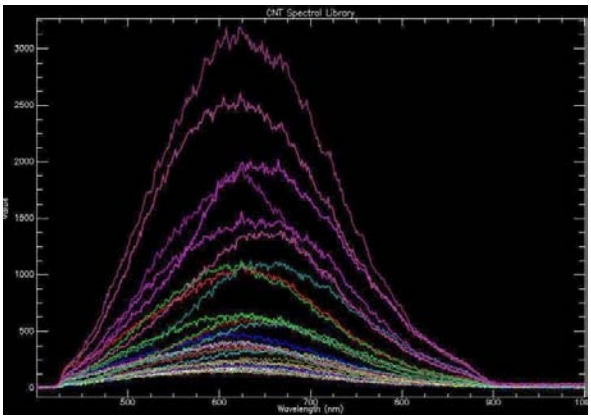

Figure 2. CNT Spectral Library

Using the CNT spectral library as a reference to match spectra across the entire filter image, pixels containing CNTs were mapped in red (see Figure 3). Showing the mapped regions on a dark background (Figure 4), of small areas, as well as larger aggregates, of CNTs within the filter are evident. The same CNT spectral library did not map any pixels in a control blank filter sample.

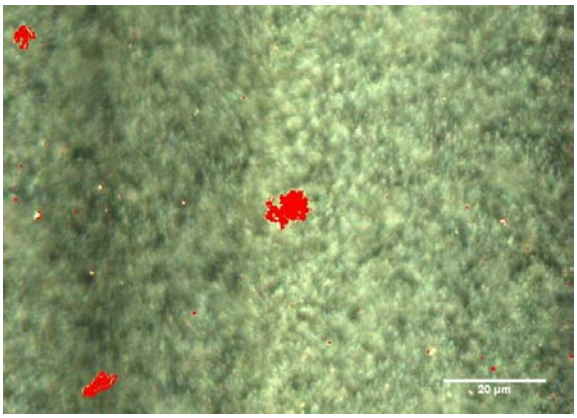

Figure 3. CNTs Mapped in Polycarbonate Filter

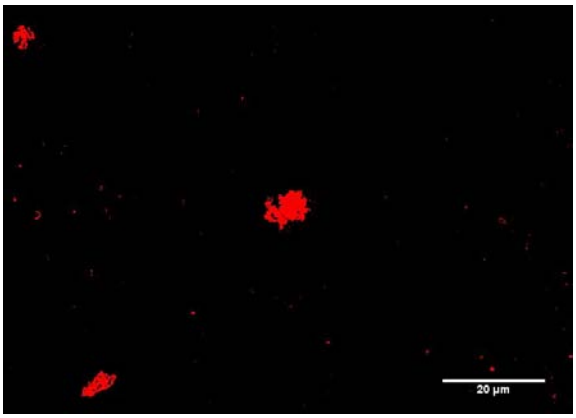

Figure 4. CNTs Mapped in Polycarbonate Filter, Dark Background

CytoViva's hyperspectral microscopy system can be used to perform this type of analysis in minutes, making it a fast, accurate and affordable solution for airborne nano-material detection.

CytoViva, Inc. • 570 Devall Drive • Suite 301 • Auburn, AL • 36832
info@cytoviva.com • 888-737-3130 • www.cytoviva.com