



Criminalistics Section – 2004

B103 An Overview of Chemical Imaging in Forensic Sciences

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The goal of this presentation is to demonstrate the use of chemical imaging in the examination of various types of forensic evidence.

Chemical imaging has been successfully applied to various types of forensic evidence such as fingerprints, questioned documents, fibers, paint, tape, and drugs. This presentation focuses on examples of these specific applications as well as the use of chemical imaging as a universal tool for forensic scientists.

Chemical imaging combines molecular spectroscopy and digital imaging for the chemical analysis of materials by recording images of the sample as a function of wavelength using a liquid crystal imaging spectrometer – where a fully resolved spectrum unique to the material is recorded for each pixel location in the image. Contrast in the resulting chemical image is indicative of the varying amounts of absorptions, emissions or scattering that occurs at a given wavelength of light. This provides structural, quantitative, and compositional information.

Raman chemical imaging, fluorescence chemical imaging, and visible reflectance chemical imaging (color analysis) provide many benefits and increased capabilities to forensic scientists. Chemical imaging is a non-destructive technique requiring little to no sample preparation, thus, decreasing the potential of contamination and increasing the efficiency of sample analysis. In addition, Chemimage[®] software (Chemlcon, Inc.), used to process and interpret chemical imaging data, far exceeds routine spectral interpretation. Statistical strategies coded in the software may be utilized to extract and summarize key discriminating information, providing a simple-to-interpret graphical interface for powerful spectroscopic analyses.

Visual information is critical in most cases for a forensic scientist to articulate scientific information to a lay juror. Chemical imaging allows the chemical information of materials to be displayed in images as well as spectra, making the results of technical information easier to understand.

Chemical Imaging, Trace Evidence, Fingerprints