D71 Validation of the CI Print Macroscopic Chemical Imaging System for the Analysis of Latent Fingerprints

Rebecca L. Schuler, BS, ChemImage Corporation, 7301 Penn Avenue, Pittsburgh, PA 15208; David Exline, MSFS, RJ Lee Group, 350 Hochberg Road, Monroeville, PA 15146; Tammy Powers, BS, ChemImage Corporation, 1407 Eisenhower Boulevard, Richland Square II, Suite 105, Johnstown, PA 15904; Paul Johns, St. Francis University, PO Box 600, Loretto, PA 15940; and Patrick Treado, PhD, ChemImage Corporation, 7301 Penn Avenue, Pittsburgh, PA 15208*

After attending this presentation, attendees will learn about the validation research of the CI Print Macroscopic Chemical Imaging System (ChemImage Corporation, Pittsburgh, PA). How chemical imaging is applied to latent fingerprint visualization as well as the advantages of chemical imaging over conventional methods will also be discussed.

This presentation will impact the forensic community and/or humanity by improving detection and visualization of fingerprints to the forensic science community. Chemical Imaging is an evolving technology that provides this improvement.

This oral presentation will describe the research that ChemImage Corporation has put forth to develop and validate a cost effective macroscopic chemical imaging system for latent fingerprint analysis. The validation research focused on establishing the CI Print as a reliable technique for fingerprint imaging. The validation procedure included reproducibility studies, age degradation studies, substrate variation studies, chemical treatment studies and a glycine limit of detection study. These studies included both raw images and processed images. Every image was compared back to a set of known inked fingerprints from the donors to evaluate the possibility of artifacts or deleted minutiae. All samples imaged using chemical imaging techniques, were also imaged using a conventional method of fingerprint imaging (i.e., digital camera and single-barrier filter configuration).

Chemical Imaging is a validated technology that combines molecular spectroscopy and digital imaging to provide morphological, compositional and structural information of materials. Through the use of an electrooptical imaging spectrometer, images of latent fingerprints and other trace forensic evidence materials are recorded as a function of wavelength, generating a fully resolved spectrum unique to the material for each pixel location in the image. Advantages of chemical imaging over conventional methods include lower detection limits and increased contrast between the sample and the underlying background.

The CONDOR™ Macroscopic Chemical Imaging System is the predecessor to the CI Print system. The luminescence and visible absorbance chemical imaging modes of the Condor have been successfully applied to various treated and untreated fingerprint samples. Chemical imaging using the CONDOR has also been used to demonstrate increased contrast of fingerprints developed on difficult backgrounds such as those that are dark, uneven, fluorescent and/or multi-colored surfaces. The CONDOR has been a viable strategy for detecting the most challenging latent fingerprints when standard development methods fail, and has also proven useful for other forensic analyses, including biological stains, inks and gun shot residue.

ChemImage's CI Print is a modified version of the CONDOR Macroscopic Chemical Imaging System. It was developed using smaller and more cost effective components and is designed specifically for the use of latent fingerprint analysis. The CI Print can be used on both routine and difficult samples. A comparison of sensitivity and application specific parameters will be discussed to compare and contrast the CI Print and the CONDOR.

This validation study yielded promising results. The CI Print produced higher contrast fingerprint images than the conventional method. Also, improved detection limits of glycine were achieved using the CI Print system as compared to the conventional barrier filter method. Lastly, the specialized image processing software used with the CI Print system, ChemImage X-Pert™, produced images with higher fingerprint to substrate contrast than conventional methods when evaluated on difficult substrates. The CI Print Macroscopic Chemical Imaging System has been shown to be a valid method for the imaging of routine as well as difficult latent fingerprints.

Chemical Imaging, Fingerprints, Validation

 ** Presenting Author*