



Questioned Documents Section – 2010

J17 Hyperspectral Imaging vs. Video Spectral Analysis: A Continued Comparison of Ink Discrimination Capabilities

Derek L. Hammond, BA*, U.S. Army Criminal Investigations Lab, 4930 North 31st Street, Forest Park, GA; and Sara E. Nedley, MS, Cara A. Plese, BS, and Rebecca Schuler, BS, ChemImage Corporation, 7301 Penn Avenue, Pittsburgh, PA 15208

After attending this presentation, attendees will understand how hyperspectral imaging compares to video spectral analysis for the discrimination of black ballpoint inks.

This presentation will impact the forensic science community by providing information for alternative, nondestructive methods of ink analysis and discrimination.

Forensic document examiners have a need for reliable and nondestructive methods for discriminating between handwritten entries made by different writing instruments. Traditional methods of analysis for the nondestructive differentiation of inks include the use of dichroic filters, ultraviolet lighting, digital imaging, and video spectral analysis. Of these, video spectral analysis may be the most commonly used nondestructive method of analysis used today to discriminate between visually similar inks.

In a previous study¹, 44 different black ballpoint pens were used to make 990 pen-pair samples for discrimination analysis comparing two nondestructive techniques: digital imaging² and video spectral analysis³. At least 187 pen-pairs could not be discriminated through the use of video spectral analysis methods.

A blinded study was performed on a subset of the 990 pen-pair samples, including some of the 187 pen-pairs which were previously found to be indistinguishable through video spectral analysis methods. This study will expand upon the data acquired from the initial subset of 99 pen pairs by continuing to assess the discriminatory power of hyperspectral imaging technology⁴. A comparison of results between hyperspectral imaging (operating in the visible/NIR reflectance and NIR luminescence modes) and traditional video spectral analysis will be presented. Current data indicates that hyperspectral imaging is capable of discriminating black ballpoint pen-pair samples previously found to be indistinguishable through video spectral analysis.

References:

- ¹ Hammond, D. L., Validation of LAB Color Mode as a Nondestructive Method to Differentiate Black Ballpoint Pen Inks, *J. For. Sci.*, Vol.52, No 4., pp. 967-973, July 2007
- ² L*A*B* Color Mode using Adobe® Photoshop®
- ³ RIR and IRL using a Foster & Freeman VSC4C
- ⁴ ChemImage's HSI Examiner 100 QD hyperspectral imaging system

Hyperspectral Imaging, Ink Discrimination, Questioned Documents