



Questioned Documents Section – 2010

J2 Hyperspectral Imaging of TLC Plates: A Novel Approach to Ink Discrimination

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After attending this presentation, attendees will understand how hyperspectral imaging can be applied to the visualization of Thin Layer Chromatography (TLC) plates and aid in ink discrimination.

This presentation will impact the forensic science community by introducing a novel approach to TLC plate visualization and ink discrimination.

Hyperspectral imaging (HSI) is a proven, versatile technology, allowing for the analysis of many types of samples, including a variety of questioned document samples. Previous studies have shown HSI to be highly discriminatory in the analysis of black ballpoint inks. Although HSI is able to differentiate black ballpoint inks in cases where other optical imaging methods cannot, there remain samples that cannot be differentiated by any method.

Forensic document examiners use a variety of techniques to determine the chemical properties of ink samples, including spectral analysis, fluorescence imaging, and various forms of chromatography. Using TLC, a sample is separated into its various constituents that are displayed as colored or fluorescent spots on a silica gel coated plate. The plate, with its resultant "spots" can be further visualized for ink components not readily visible to the naked eye. The plate can be evaluated using visible reflectance, near-IR reflectance, and/or fluorescence hyperspectral imaging to visualize the spots and therefore ascertain additional chemical information.

This study will demonstrate that combining HSI and TLC provides document examiners with increased discriminatory power and analytical versatility in determining differences between various black ballpoint ink samples. Preliminary data indicates that HSI is capable of discriminating black ballpoint ink samples, previously found to be indistinguishable, through the analysis of prepared TLC plates. By performing hyperspectral imaging of TLC plates and comparing the resulting data, certain inks that were previously categorized as indistinguishable by a number of investigative methods are now categorized as different.

Hyperspectral Imaging, Thin Layer Chromatography, Ink Discrimination