B142 Developing Quantitative Measurements and Test Materials for Fingerprint Development Reagents Using Inkjet Printing

Edward Sisco, MS, NIST, 100 Bureau Drive, MS 6431, Gaithersburg, MD 20899; and Marcela Najarro, MFS, NIST, 100 Bureau Drive, MS 8371, Gaithersburg, MD*

After attending this presentation, attendees will: (1) understand the motivation and potential benefits of using standardized and quantifiable test materials to evaluate the stability and efficacy of their fingerprint development reagents; (2) understand what has taken place to create these materials and evaluate their stability and lifetime; and, (3) possess insight into potential issues that can arise with long-term storage of their reagents.

This presentation will impact the forensic science community by presenting a method through which examiners can reliably and reproducibly monitor the efficacy of their fingerprint developers using standard test materials, thus minimizing issues arising from using one's own fingerprint.

While the use of fingerprint development reagents is universal throughout forensic science laboratories, the methods for ensuring the reagents are working properly are not. Numerous methods exist, though the most common is to develop one's own fingerprint to see if the reagents are working properly. Due to the inherent variability in fingerprint composition, this practice does not provide a means for reproducible evaluation of the reagents over a period of time. In order to truly understand the efficacy, quality, stability, and lifetime trends of the developing reagents, a quantitative method of evaluation needs to be developed.

The work presented here highlights the development of quantifiable fingerprint reagent test materials created using high precision inkjet printing. Using this technology, it is possible to create highly reproducible (~1% Relative Standard Deviation (RSD)) deposits of chemicals to test the reagents. The test materials contain an array of arrays with increasing surface concentrations of an analyte(s) of interest. By providing a range of surface concentrations, it is possible to obtain a better understanding of the efficacy of the reagent beyond a single-point red light/green light approach. The original work began with the creation of amino acid-containing test materials to quantifiably evaluate reagents such as ninhydrin and 1,2-indanedione on porous surfaces. With the high precision of inkjet printing, it is not only possible to evaluate the efficacy of these reagents but also to establish limits of detection for the reaction to be observed.

This presentation will focus on the development of these test materials, which includes establishing appropriate test levels, evaluating the lifetime of the materials under different environmental conditions, identifying necessary storage considerations, and obtaining feedback from forensic laboratories throughout the country. This presentation will also discuss methods that have been developed to quantitatively evaluate the initial amount of material deposited to create the materials, the reactions, and potential solvent bleed of various developer reagents. In addition to the creation of amino acid standards, standards for the reagents which react with sebaceous components, cyanoacrylate, and non-porous surfaces will also be discussed. Advantages of this type of test material and potential issues with the use of one's own fingerprint as a check method will also be presented.

Latent Fingerprints, Developer Reagents, Inkjet Printing