E35 Forensic Discrimination of Ballpoint Pen Inks on Documents Using LA-ICP/MS

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After attending this presentation, attendees will learn the differentiation of ballpoint pen inks (black and blue) written on documents through an Laser Ablation-Inductively Coupled Plasma/Mass Spectrometry (LA-ICP/MS) methodology.

This presentation will impact the forensic science community by describing how to achieve discrimination on a forged document.

The differentiation of ballpoint pen inks (black and blue) written on documents through an LA-ICP/MS methodology is proposed. Size A4 white office paper containing ink strokes from ballpoint pens of known origin were cut and measured without any sample preparation. In a first step, Magnesium (Mg), Calcium (Ca), and Strontium (Sr) were proposed as Internal Standards (IS) and used in order to normalize elemental intensities and subtract background signals from the paper. Then, specific criteria were designed and employed to identify target elements which resulted independent of the IS chosen in most of the cases and allowed a qualitative clustering of the samples. In a second step, a normalization data based on the targets previously identified was used to obtain mass independent intensities and perform pairwise comparisons by means of statistical analyses. This treatment improved the Discrimination Power (DP) and provided objective results, achieving a complete differentiation among different brands and a partial differentiation within pen inks from the same brands. The results show that 25 samples of black ballpoint pens and 14 samples of blue ball point pens, all available on the local market, were successfully discriminated and identified.

Ballpoint Pen Inks, LA-ICP/MS, Forensic Discrimination