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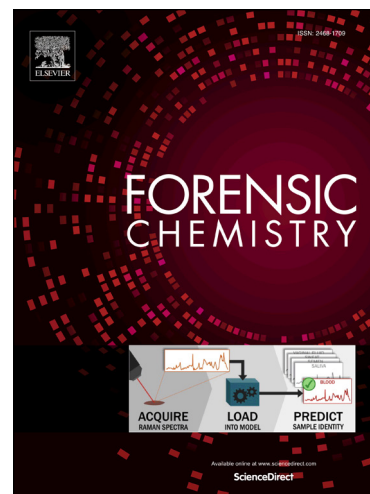
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# Determination of deposition order of blue ballpoint pen lines by MeV Secondary Ion Mass Spectrometry

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## Abstract

Secondary Ion Mass Spectrometry using MeV ion excitation was utilised for the analysis of optically indistinguishable intersecting ballpoint pen lines on paper. It was demonstrated that the technique was able to identify different colorants (dyes and synthetic organic pigments) with high efficiency and in a single measurement. The analysis of ink-ink intersections was performed using the Time-of-Flight mass spectrometer for MeV Secondary Ion Mass Spectrometry. This technique is attached to the heavy ion microprobe at the accelerator facility, and employs focused 8 MeV Si<sup>4+</sup> ions for the surface analysis. Molecular imaging allowed for successful identification of sequence deposition order of otherwise optically indistinguishable intersecting lines.

## Keywords

MeV-SIMS, Forensic Document Examination, intersecting ink lines, heavy ion microprobe, molecular imaging

## 1. Introduction

Analysis of ink in questioned documents is a highly important area of forensic science, and there is currently no standard technique for the investigation of sequence order of deposition for intersecting lines [1].

Standard procedure for investigation of inks in questioned documents involves optical examination, use of alternative light sources (ultraviolet or infrared), and chemical analysis by High Performance (HP) Thin Layer Chromatography (TLC) or standard TLC [2].

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