



## Questioned Documents Section - 2016

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### J17 Properties of Inkless Pens

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After attending this presentation, attendees will better understand the detailed properties of inkless pens on different substrates (paper types).

This presentation will impact the forensic science community by explaining the findings of research into the macroscopic, microscopic, physical, and chemical properties of one type of inkless pen.

The current iteration of the “inkless pen” is not really new at all, but is rather a type of writing instrument that relies on metalpoint. Metalpoint is the classic drawing technique that uses a sharpened metal rod or wire to make the visible lines on a writing surface, typically paper or parchment. This visible line is the result of metallic deposition of material on the page. The metal was typically lead, silver, copper, or gold, although silver was most the common and “silverpoint,” as it is called, has achieved popularity as an art form many times during the past 600 years. The new inkless pens are marketed not so much for artistic purposes but for general use on a variety of surfaces.

Forensic Document Examiners (FDEs) must be aware of such writing instruments in both the historical and present-day context. In this research, the detailed physical and chemical properties of one brand of inkless pens and their written line are explored.

Various paper types were written upon to determine what effect different materials would have on the appearance and morphology of the written line. These paper types included assorted wood fiber writing papers, assorted non-impact printing papers, cotton content writing paper, newsprint, mixed fiber boxboard, stone paper, wax paper, thermal paper, and water-resistant paper. Examination of the written line was accomplished with the unaided eye and via stereomicroscopy with surface profiling by confocal microscopy. A descriptive assessment of the written line on these different substrates is provided with some insights into which of these substrates are not as suitable and the potential reasons for this. Additional examination of the written lines was conducted by radiographic and analytical chemical methods for inorganic and elemental composition.

The resistance of the written line to erasure and alteration on these different paper types was also explored. Erasure was attempted by hand-held erasers, chemical attack, and laser ablation. A qualitative assessment of the degree of “inkline” removal was made. Analysis also sought to determine whether any alterations to entries could be detected by radiographic methods, given the composition of the writing line as determined by various analytical methods. This approach differs from previous work which explored whether spectral differentiation of the written lines from inkless pens could be achieved.<sup>1</sup>

Finally, a detailed examination of the indentations produced by these inkless pens on the various substrates was conducted. These examinations included simple indentations as well as the intersections of the written line with already-present indentations.

While this analysis and reporting is comprehensive for one brand, it cannot be extrapolated to other brands of metalpoint, inkless writing instruments. This research serves to educate the FDE community and to explore options for analysis in the event one is confronted by this technology during the course of casework.

#### Reference(s):

1. Gardner, M. Inkless Pens? *Proceedings of the American Society of Questioned Document Examiners*, 2015, Toronto, Canada.

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#### Writing Instrument, Inkless Pen, Document Examination