J32 Forensic Characterization and Discrimination of Manila Envelopes

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Learning Overview: After attending this presentation, attendees will understand the meaningful physical and chemical differences among manila envelopes produced by different manufacturers that can be used to discriminate and/or identify several brands of this type of envelope.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by evaluating commonly employed physical and chemical analytical techniques to determine which offers the greatest discrimination potential, thus developing an analytical protocol for the forensic analysis of manila envelopes.

Envelopes are important probative items of evidence that are analyzed by forensic document examiners as they can be found at crime scenes when ransom, threat letters, or potentially harmful substances are sent to victims in an envelope through the mail. The use of manila envelopes in the United States is quite common because they are made of thick and durable manila paper; thus, they are frequently used to transport or send documents. There does not exist previously published research on the physical or chemical characterization of manila envelopes. Although there are many studies on the forensic analysis of office paper and paper-based banknotes, and only a few on white envelopes, a gap in the research has been identified. The ability to offer a way to systematically analyze manila envelopes, starting with the non-destructive techniques and using the most discriminating techniques, will be useful for the document examiner and the investigation.

The purpose of this research was to analyze manila envelopes using analytical methods commonly used for the analysis of paper and adhesives to be able to characterize and compare those sold by different manufacturers as well as the envelopes included in the same and different batches from the same manufacturer. Thus, this study investigated whether there are meaningful differences among them, and if these can be used for forensic discrimination and/or identification of the manufacturer. Samples from five manila envelopes, size 9"x12", from three boxes purchased from ten different brands were analyzed to evaluate the commonality between brands and determine the best methods for the discrimination of the envelopes. The analytical methods studied in this research included physical measurements of the envelopes and their folds, color examination using a colorimeter, the use of Alternate Light Sources (ALS), and chemical analysis using Thin-Layer Chromatography (TLC), Attenuated Total Reflection/Fourier Transform Infrared (ATR/FTIR) Spectroscopy, Raman Spectroscopy, X-ray Fluorescence (XRF), and X-ray Powder Diffraction (XRD).

Results indicate that IR spectroscopic analysis of the manila paper did not show meaningful differences; however, it was able to discriminate the adhesive between several of the various brands. Significant differences between brands were observed based on Raman spectra of the manila paper, as well as several physical measurements, including weight and thickness. Thus, it was concluded that detectable chemical and physical differences in the paper and adhesives of manila envelopes can be used for brand discrimination and have the potential to be used for brand identification.

Manila Envelopes, Physical and Chemical Analysis, Brand Discrimination