J28 Methods of Assessment of True, Simulated, and Counterfeit Watermarks

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After attending this presentation, participants will gain a knowledge base upon which to rely when selecting an assessment method for suspect watermarks.

International travel documents and currency contain true watermarks. The ability to identify counterfeit versions of these items is critical to financial and security interests. This presentation will impact the forensic community by providing technical information essential to this effort.

The watermark has long been used as a document identification and security feature, with the earliest watermarked papers dating from 1282 in Italy. These marks included various information about the paper, such as the maker, manufacturing date, quality, or size. It would be many years before the next major advancement; in 1848, an Englishman, William Henry Smith, invented the "light and shade" watermark.

Since then, watermarks have been used as anti-counterfeiting security elements in currency and identification documents. High quality watermarks are difficult for counterfeiters to simulate, and are relatively inexpensive compared to other high-tech document security devices.

In the 20th century, the use of watermarks in the paper used for corporate and government correspondence was widespread. However, this practice has been practically eliminated, perhaps due to the high cost of watermarked paper and the widespread use of office-based computer printers.

Recently, companies marketing document security elements have introduced products that they describe as watermarks, or as being like a watermark; they can more accurately be described as "simulated watermarks". Based on this development, it became necessary to rename the watermark; it is now commonly referred to as a "true watermark". Unfortunately, the new lower cost alternatives are more susceptible to counterfeit reproduction. In fact, some of the legitimate techniques utilize the exact methods used by counterfeiters to reproduce "true watermarks".

In order to establish a scientific basis for the assessment of "true watermarks", "simulated watermarks" and counterfeit watermarks, extensive analyses of all three are being conducted.

The types of assessments can be grouped into three categories: chemistry, digital, and physical. The chemical testing includes Fourier transform infrared (FTIR), gas-chromatography coupled with mass spectrometry (GCMS), and pyrolysis (py-GCMS) characterization of the watermarks.

The digital assessment methods identified to date are ImageXpert (a commercially available image quality measurement system) and transmitted- light scan measurements. The physical assessments are examinations using x-ray, ultraviolet and infrared sources, transmitted light and micrometer.

The use of physical assessments to differentiate true watermarks from counterfeit watermarks has an historical basis; visual examinations using transmitted light reveal differences in design and detail, x-ray examination reveals the absence of an image when a counterfeit watermark is present.

The reliability of these two assessments, as well as the others listed above, will be tested in the current research.

The assessments in the other categories do not have an historical basis; the chemistry assessments are both classic and innovative, while the digital assessments are totally innovative.

Based on the fundamental differences in the methods used to produce true watermarks and the simulated/counterfeit versions, the working hypothesis for all of the assessments conducted in the current research is that they will show considerably different results for the two test groups and that they may show similar results within the simulated/counterfeit group.

Equipped with the results of this research, forensic document examiners will gain a knowledge base upon which to rely when selecting an assessment method for suspect watermarks.

Watermark, Counterfeit, ImageXpert

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