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## **The Physics of Nanolayer Metal Deposition as a Visualization Method to Resolve Latent Fingerprints**

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**Abstract:** Numerous techniques have been studied and later employed to visualize and preserve latent fingerprints. While several techniques which have withstood the test of time are preferred, one technique however, is casually mentioned in textbooks but is rarely discussed or employed as a viable method to visualize fingerprints contained on surfaces of small evidentiary objects. The commonly used methods employ dry powders, cyanoacrylate vapors or wet chemistry to visualize human friction ridge patterns. This work examines the physical vapor deposition process of silver nanolayers sublimed on glass, plastic, paper and metal substrates and also describes the physics of the process and observed optical properties of the metallic thinfilms. Varying thicknesses of silver ranging from 1.0 to 10.0 nanometers were deposited on substrates and examined for optimal spectral, transmittance and reflectance signals. Subsequent analyses of latent fingerprints imprinted on surfaces were performed after vapor deposition of silver addressing the optical properties, visualization and optical tuning for optimal resolution and contrast.

**Biography:** Dr. Kocanda is a chemistry and bioengineering professional with extensive research experience in academia, industry and public safety. Primary interest is the forensic analysis of chemical, biochemical, biometric and environmental materials employing microscopy, novel sensor designs, microelectronic devices and instrumentation containing custom designed electronic applications. Specific emphasis is the development of digital and analog hardware design, sensor design using nanoscale and high vacuum fabrication methods to qualitatively and quantitatively measure trace materials. Related interests include materials characterization and physical measurements of dielectrics, piezoelectrics, semiconductors, microbial / anti-microbial materials at the nanoscale level using advanced electron microscopy, optical microscopy and spectroscopy instrumentation. Adjunct interests include nanomaterials, ballistics, digital signal processing, digital filters and authorship of journal articles and technical publications.

Martin earned a Ph.D. in chemistry (interdisciplinary with Electrical Engineering) from Northern Illinois University (2009), MS Electrical Engineering from Northern Illinois University (2008), a BS in chemistry from Elmhurst College (1987) and a BS in Computer Science from University of Illinois (1985).

He is currently employed as a Forensic Chemist with the Rapid City Police Department.

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**Where: CB#204W**