

## Article

# Visualization of Latent Fingerprints on Fabrics Using Vacuum Metal Deposition

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**Abstract:** Vacuum metal deposition (VMD) is a highly sensitive latent fingerprint development technique that involves the thermal evaporation and thin-layer deposition of metal(s) on substrates in a high vacuum environment. This research was conducted to identify the best VMD method to visualize latent fingerprints on six of the most common fabric types (i.e., cotton, satin, polyester, linen, felt, and denim) used in the fashion industry. The deposited fingerprints from seven donors were left to age for 1, 7, 14, and 28 days before being processed to determine how much the fabric substrate, age of the deposited prints (change in fingerprint composition), and donor variability affect the enhancement of the latent fingerprints.

The eight metal processes that were tested included the most often used (i.e., gold → zinc metal combination) and alternative metals and metal combinations (i.e., silver, silver → zinc, aluminum → zinc, sterling silver, sterling silver → zinc, copper, and copper → zinc).

In this study, better ridge detail was developed on tight-weave, smoother fabrics, such as satin, as opposed to loose-weave, more porous fabrics, such as linen. Poor donors left a limited amount of residue on surfaces, resulting in lower grade fingerprint development. The longer the fingerprints were aged, the fewer ridge details were developed. The overall results suggest that the copper → zinc process provided a better quality of fingerprint development than the other processes, closely followed by the aluminum → zinc metal combination.

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