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Nano fingerprints : Gathering Intelligence

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Nano fingerprints

The use of powders to develop latent fingerprints left after criminal activity has been established for many years. However, various types of substrate surfaces, such as rough materials, fabrics, and adhesives are not well suited to this type of technique. Other methods have been developed, including acid dyes, cyanoacrylate fuming (CA), and the evaporation of metals such as gold, zinc, and silver. Protocol tables have been established that apply broad classifications to surfaces and outline appropriate development techniques.

Fingerprints are biochemically complex, containing fatty acids, glycerides, amino acids, and metal ions in various proportions, excreted from eccrine and sebaceous glands. Print composition also varies from person to person, and is strongly affected by factors such as age, gender, smoking, or drug habits, which therefore help to improve development agent selection and hence enhance the detection process.

Multiple techniques can sometimes be utilized to aid development of fingerprints or obtain additional details, for example, when investigating fingerprints in blood. However, the interaction of two techniques can sometimes be detrimental and obscure information from the fingerprint, therefore further elucidation of the operation of multiple techniques helps to ensure validity.

This month’s cover image shows a back scattered electron micrograph of a fingerprint developed with two sequential techniques. Here, vacuum metal deposition of gold and zinc, following cyanoacrylate development of a latent print leads to zinc nanoparticulate decoration of the polycyanoacrylate deposits. The image was captured using a field emission scanning electron microscope, the contrast is dependent on atomic number. Operating in variable pressure mode enables imaging and analysis without the usual addition of a conducting coating.

There is more that a fingerprint could tell us. A wide consortium of research laboratories is investigating the potential to capitalize on the inter-donor variability of the biochemistry of fingerprints. Although a problem in developing prints and designing effective techniques, this variability may make it possible to gather extra intelligence about the victims or perpetrators of crime, such as age, gender, smoking, or drug habits, which could facilitate criminal investigations.

REFERENCES