

Exposing Latent Fingermarks on Problematic Metal Surfaces Using Time of Flight Secondary Ion Mass Spectroscopy

Authors : Tshaiya Devi Thandauthapani, Adam J. Reeve, Adam S. Long, Ian J. Turner, James S. Sharp

Abstract : Fingermarks are a crucial form of evidence for identifying a person at a crime scene. However, visualising latent (hidden) fingermarks can be difficult, and the correct choice of techniques is essential to develop and preserve any fingermarks that might be present. Knives, firearms and other metal weapons have proven to be challenging substrates (stainless steel in particular) from which to reliably obtain fingermarks. In this study, time of flight secondary ion mass spectroscopy (ToF-SIMS) was used to image fingermarks on metal surfaces. This technique was compared to a conventional superglue based fuming technique that was accompanied by a series of contrast enhancing dyes (basic yellow 40 (BY40), crystal violet (CV) and Sudan black (SB)) on three different metal surfaces. The conventional techniques showed little to no evidence of fingermarks being present on the metal surfaces after a few days. However, ToF-SIMS images revealed fingermarks on the same and similar substrates with an exceptional level of detail demonstrating clear ridge definition as well as detail about sweat pore position and shape, that persist for over 26 days after deposition when the samples were stored under ambient conditions.

Keywords : conventional techniques, latent fingermarks, metal substrates, time of flight secondary ion mass spectroscopy

Conference Title : ICFSFPC 2018 : International Conference on Forensic Science, Forensic Pathology and Criminology

Conference Location : Prague, Czechia

Conference Dates : August 13-14, 2018