



E103 Visualization of Fingerprints on Post-Blast Improvised Explosive Device (IED) Fragments and Debris

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After attending this presentation, attendees will understand more about the ability to detect fingerprint ridge detail on post-blast fragments, including from the IED itself and the surrounding objects in the immediate vicinity of the blast. Attendees will learn the consequences of gathering such information in terms of identifying those associated with conducting IED blasts.

This presentation will impact the forensic science community by evaluating a new, novel, non-destructive technique for post-blast fingerprint detection and visualization. It will also highlight a method by which DNA and fingerprint ridge detail have the potential to both be collected from post-blast materials from a single fingerprint deposited.

Recovering fingerprints after an explosion is a difficult process, with potential identification possible if fingerprints can be visualized post-blast. IEDs, such as pipe bombs, make use of whatever material is available. Copper, steel, and sometimes brass are materials commonly used to assemble a pipe bomb or IED. With the current international climate regarding IEDs and terrorism, it is essential that research is conducted into the post-blast identification of a bomber or bomb maker.

Detection of fingerprints on unexploded devices is possible using regular techniques targeting physical or chemical reactions with the fingerprint deposit; however, post-blast, the constituents of fingerprints are often obliterated, water evaporated, and the print potentially disintegrated. A novel approach to detecting the ridge patterns is therefore needed.

Vehicle-bound IED, mailbox bomb IED, and pipe bomb IED experiments were conducted. Both sebaceous and eccrine fingerprints were deposited on brass, copper, and steel discs, directly onto brass, copper, and steel pipe bombs, as well as on a United States mailbox. Gunpowder and C4 were the explosives used in the different scenarios. Post-blast, the discs and fragments from all scenarios were analyzed using an in-house-built, multi-spectral imaging system. Some were swabbed for DNA analysis prior to fingerprint analysis.

A varying level of ridge detail remained depending on the position of the discs in relation to the IED and blast epicenter, as well as the type of metal used for the pipe bombs. Fingerprint ridge detail was also visualized from the metal clasp on the front of the mailbox. Depending on whether the fingerprints deposited were eccrine or sebaceous also influenced the visualization capability. One major finding from the DNA swabbed fingerprints was that ridge detail was still visualized on a number of occasions even after swabbing for DNA first, highlighting the ability for both DNA and fingerprint ridge detail to be potentially collected from a single deposited print. Development of the technique, and possibly using an array of various other imaging tools, may allow for increased post-blast visualization. Being able to visualize any level of ridge detail for any of the scenarios discussed here is noteworthy.

Improvised Explosive Devices, Fingerprints, Post-Blast Identification

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