This new fingerprint technique could revolutionise the way we solve gun crime

September 12 2016, by John W Bond

Credit: AI-generated image (disclaimer)

Despite the development of DNA profiling for criminal investigation, fingerprints remain the most common type of forensic evidence to be recovered from a crime scene. From the first identifications made at Scotland Yard in the early years of the 20th century, to the computerised storage and searching that is available now, the basic concept of making

a fingerprint identification has not changed. Imperfections (or minutiae) in the pattern of ridge lines on the tips of fingers and on the palms provide the key to linking a fingerprint found at a crime scene (often referred to as a finger mark) to the fingerprint of an individual.

Since its inception, many techniques have evolved to reveal finger marks, usually deposited in sweat, at the crime scene. Some, such as the use of a fine powder applied with a brush, are as old as fingerprinting itself and remain in use because they are simple and easy to use, and are effective at revealing invisible (or latent) finger marks. Today, the numerous techniques available are neatly summarised by the Home Office Centre for Applied Science and Technology in their Fingerprint Source Book, which is essential reading for any crime scene investigator.

Generally, finger mark recovery techniques are arranged by reference to the surface (or substrate) on which the latent finger mark is deposited, with some substrates being historically problematic for latent finger mark recovery. One such substrate is the outer surface of spent brass shell casings, usually ejected from a firearm after firing.

Often, at the scene of a crime involving the discharge of a fireman, these spent shell casings present the only physical evidence left by the offender, so their importance shouldn't be underestimated. Latent finger mark recovery from spent shell casings is difficult as the area of contact between the finger and the casing is limited due to the curvature of the casing and also because of the environmental extremes undergone by the casing during firing and ejection, which can all but obliterate latent finger marks.

Solving the mystery

Following a serendipitous finding by researchers at Swansea University that rubbing a metal surface with a tissue does not necessarily remove

the finger mark ridge minutiae, we started to investigate why this might be so – and, importantly, how the finger mark might be revealed. Through experimentation, we were able to show that the inorganic components present in fingerprint sweat, particularly chloride ions, were able to induce corrosion on the metal surface at the location of the finger mark deposit. Further, this corrosion was quite difficult to remove and remained even after washing the metal in warm soapy water to remove any trace of the original sweat deposit.

Shell casings are notoriously difficult to fingerprint.

Copper and its alloys (such as brass) were found to be very easily

corroded by fingerprint sweat, which, potentially, makes this useful for finger mark recovery from spent brass shell casings. After further experimentation, a technique was devised that enabled a fine coloured powder to adhere preferentially to areas of corrosion on a brass disk, to which had been applied a large (about 2,500 V) electric potential.

This powder adherence was developed to work with round brass shell casings, rather than a flat disk, and eventually commercialised.

What now?

As might be expected, the main market for such technology lies outside the UK and since its development, has been used in many criminal cases, mainly in the US, to try and recover finger mark corrosion from spent brass shell casings. One positive aspect is that, because the corrosion is difficult to remove from the brass, the technique can be applied to casings that are many years old and relate to what are termed "cold cases". Fortunately, law enforcement agencies rarely destroy evidence – particularly from unsolved homicides – and these offences present ideal evidence for this technique.

In 2015, the University of Leicester signed an agreement with Zhejiang Police College in China to collaborate in advancing forensic science research and teaching. An early result of this has been the joint development of an improvement in the way this technique works. Essentially, the electrically charged shell casing is now rotated in a bed of the powder, which makes the process easier than the original method of applying the powder directly to the casing.

Why is this new development important? Well, as finger mark visualisation techniques that are quick, easy and effective are preferred, anything that makes the process easier to produce a positive result is to be welcomed. As the use of firearms in crime seems unlikely to

diminish, this development offers law enforcement agencies a further opportunity to crack cases.

This article was originally published on The Conversation. *Read the* original article.

Source: The Conversation

Citation: This new fingerprint technique could revolutionise the way we solve gun crime (2016, September 12) retrieved 21 June 2024 from https://phys.org/news/2016-09-fingerprint-technique-revolutionise-gun-crime.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.