Scientists trial fingerprint development method for Britain's new polymer banknotes

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New research into the most effective way of lifting fingerprints from polymer banknotes has been led by scientists at Loughborough University.

In September 2016, the Bank of England will introduce a new £5 polymer banknote into circulation. The following year, the same thin and flexible plastic material will be used for a new £10 note, and by 2020, new £20 notes will also be made available.

Developing fingerprints from this new surface represents an important forensic challenge as current imaging protocols for paper currency will potentially become redundant once the new notes are issued.

This preliminary investigation into the recovery of fingerprints from precursor test notes has successfully demonstrated that fresh latent fingerprints, not immediately visible to the naked eye, can be developed using elemental copper deposited via a highly sensitive technique known as vacuum metal deposition (VMD). The results can then be imaged using near-infrared illumination. In addition, a forensic gelatine sheet can be used to lift from the treated note's surface and then the fingerprints revealed to the naked eye by spraying the sheet with rubeanic acid – a development reagent – which reacts with the copper to produce a visually distinguishable fingermark.

Loughborough University's Dr Paul Kelly, Reader in Inorganic Chemistry, and his research team from the Chemistry Department,

collaborated on the study with forensic science equipment suppliers Foster + Freeman Ltd (led by former Loughborough PhD student Dr Roberto King who worked under Dr Kelly) and the Home Office Centre for Applied Science and Technology (CAST).

Dr Kelly's approach means that VMD treated polymer notes may potentially be able to re-enter into circulation rather than having to be destroyed. The gelatine lifting procedure provides a physical record of the development process and marks a further advancement of previous gel applications by Dr Kelly and his research group including combating heritage crime (in the form of metal theft) and the extraction of a chemical blueprint from stone – an early trial of a technique to help address the rising issue of stone theft.

Dr Kelly said: "Our preliminary study into this method of fingermark recovery has demonstrated elemental copper's future suitability for use by forensic examiners in evidence gathering in a variety of situations, from extracting fingerprints from polymer notes used in fraudulent/illegal activities, to linking suspects to stashes of stolen cash or even to forged items.

"The use of the near-infrared illumination procedure is of particular benefit because, allied to the copper deposition, it not only allows visualisation of print, it results in significant ridge detail. The thicker the copper deposition layer, the better the contrast, even on a substrate with a patterned background – and the new polymer notes are decorated with deliberately complex features.

"The next stage of our research will be to see if this new and versatile twist to traditional VMD techniques can be used to enhance fresh fingermarks on other pertinent polymer-based materials, such as carrier bags. We would also like to investigate the possible effect of wear and tear on the VMD development process when analysing handled polymer

banknotes.

"In addition, it's worth noting that collaborations like this one, between the University, Bank of England, Foster + Freeman Ltd, CAST, and West Technology Systems Limited, show just how effective joint working can be on what is both a timely and important issue."

More information: Lloyd W.L. Davis et al. Visualisation of latent fingermarks on polymer banknotes using copper vacuum metal deposition: A preliminary study, *Forensic Science International* (2016). DOI: 10.1016/j.forsciint.2016.05.037

Provided by Loughborough University

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