Fingermark Visualisation on Polymer Currency (Bank of England)

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The base material of the new £5 and £10 polymer banknotes from the Bank of England (BoE) is polypropylene plastic, and they are non-uniformly coated in a varnish. The banknotes feature transparent windows, printed areas of varying detail, and foil patches.

The fingermark visualisation processes recommended for paper-based banknotes, for example ninhydrin, are ineffective on non-porous substrates. Therefore alternative recovery processes were studied on the new polymer £5 notes in 2016, and this has been expanded upon in 2017, with further laboratory-based investigations on uncirculated £10 polymer banknotes.

Studies on polymer banknotes issued by other countries have been carried out. However it is not always possible to use findings from overseas research because of differences in the banknotes themselves, not all the processes available within the UK were included in the overseas studies, and because of differing environmental conditions between countries. Therefore CAST has carried out investigations on new BoE banknotes using a comprehensive array of processes to ascertain which are the most effective to visualise fingerprints.

The advice presented here was generated from the results of these experiments. It should be used in conjunction with the Fingermark Visualisation Manual. Results and validation data from the £10 note study will appear in a journal paper which is in preparation. The reference for the study on £5 banknotes is - Downham R P, Brewer E R, King R S P, Luscombe A M, Sears V G, Fingermark visualisation on uncirculated £5 (Bank of England) polymer notes: Initial process comparison studies; Forensic Sci Int, 2017; V275; p 30–43.

For more information regarding the new polymer banknotes, see the Bank of England web pages at: http://www.thenewfiver.co.uk, http://www.thenewten.co.uk

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IR Reflection and gelatin lifting can provide similar background pattern elimination results when black powder-based processes have been used. However, one technique can sometimes add benefit over the other. IR Reflection may be slightly less effective than gelatin lifters overall, but it is non-destructive, whereas the application of a gelatin lift may impact on the effectiveness of subsequent processes.

When viewing or imaging fingermarks over transparent windows, it may be necessary to experiment with different backgrounds in order to achieve the optimum results. In the above example, the images on the left have been photographed on an absorbing background below the banknote and the images on the right have been photographed on a reflective background. The best results are achieved using IR Reflection with an IR reflective background (lower right image).

Some processes produce light coloured fingerprint ridges that can be very difficult to observe with Visual Examination and IR Reflection on the polymer banknotes, including titanium dioxide-based powder suspension and fpNatural® 2 powder. These may be more easily visualised using black gelatin lifters.