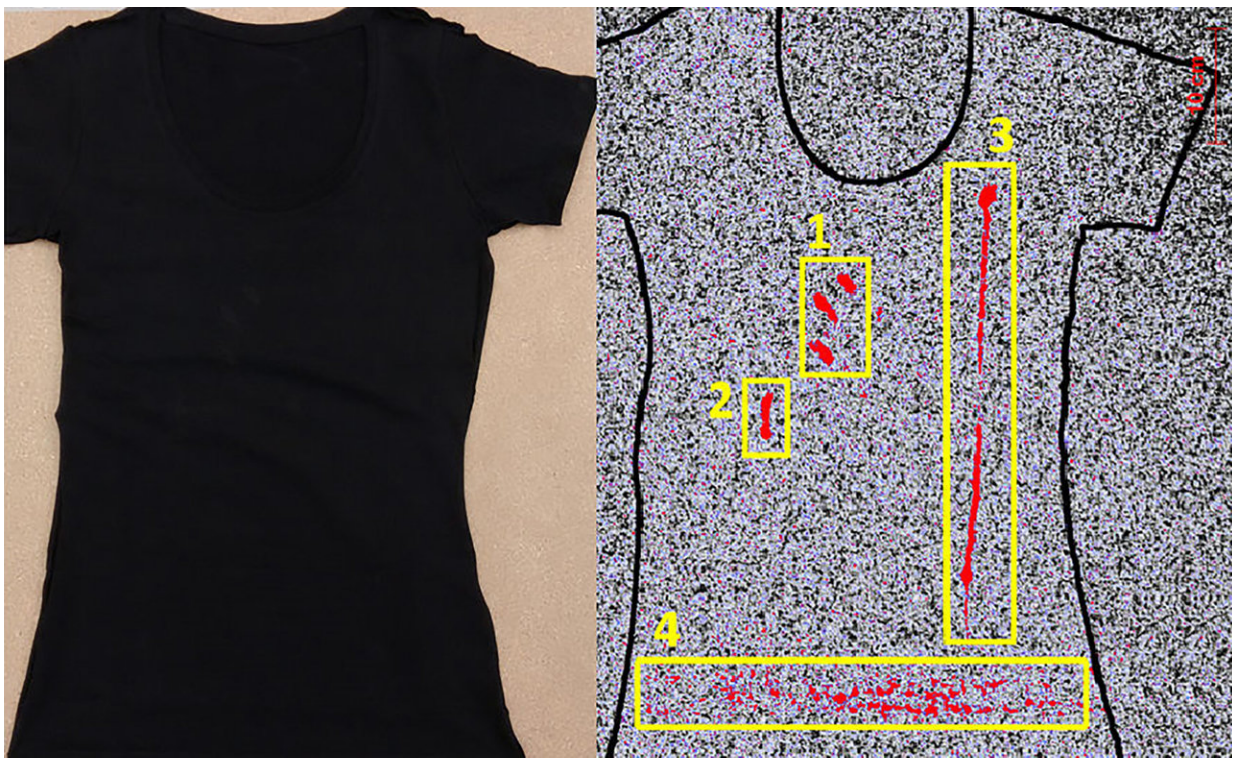
Scanner for paintings turns out to be promising new CSI tool

November 14 2017

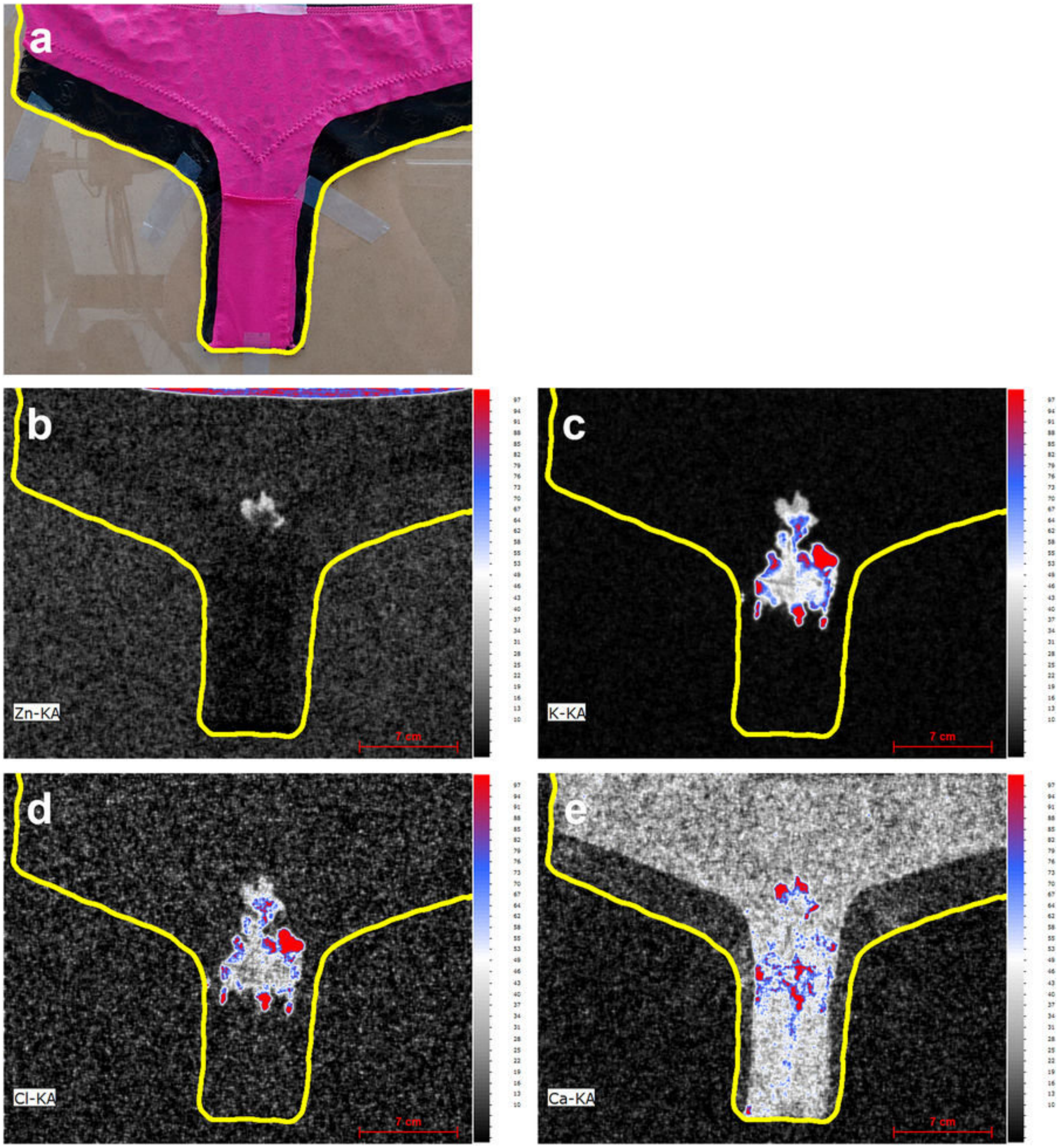


Four different bloodstains on a black T-shirt, made visible using MA-XRF on the basis of the iron and potassium signal. Credit: Delft University of Technology

A research collaborative has introduced a new method for detecting hard-to-find and concealed forensic traces. This work was officially published today in *Scientific Reports* and is based on scanning macro x-ray fluorescence spectroscopy (MA-XRF), a technique originally developed for the elemental imaging of paintings and other works of art.

In art science, MA-XRF is known for revealing hidden paint layers, and this exciting feature has assisted in art authentication and enabled studies into the creative processes of artists. In the current study, the potential of MA-XRF in forensic science has been demonstrated for the first time. Elemental signatures of biological traces (such as blood, sperm, urine and sweat) and complex gunshot residue patterns allow the detection and imaging of such traces on clothing items that are too dark or too fluorescent for traditional techniques.

The method is fully compatible with forensic DNA profiling. Additionally, the new method offers interesting opportunities for aged traces, mixed stains, traces of poor quality and traces that have been accidentally or intentionally concealed. MA-XRF based lead imaging for example enabled the detection of a bullet impact in a wall even if multiple layers of paint are applied to conceal the evidence.



MA XRF elemental scans of female underwear containing a semen and urine stain applied under controlled conditions. Credit: Delft University of Technology

More information: Kirsten Langstraat et al. Large area imaging of forensic evidence with MA-XRF, *Scientific Reports* (2017). DOI: 10.1038/s41598-017-15468-5

Provided by Delft University of Technology