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Seeing the Invisible: New 'CSI Tool' Visualizes Bloodstains and Other Substances

Snap an image of friends in front of a window curtain and the camera captures the people -- and invisible blood stains splattered on the curtain during a murder. Sound unlikely? Chemists from the University of South Carolina are reporting development of a camera with that ability to see the invisible, and more.

Called multimode imaging in the thermal infrared, the new technology could find uses in crime scene investigations and elsewhere, they say in a series of three reports in ACS' Analytical Chemistry.

Michael Myrick, Stephen Morgan and their graduate student colleagues explain that the luminol test (mainstay method for detecting blood stains and other body fluids at crime scenes) has certain disadvantages. Luminol, for instance, is potentially toxic; has been reported to dilute blood solutions below DNA detection limits; can smear informative blood spatter patterns; and can provide false positive results.

In the reports, the scientists describe the construction and successful testing of a camera that takes images in several different ways. It captures hundreds of images in a few seconds, while illuminating its subjects with pulses of invisible infrared light waves. Some of these photos are taken through special filters, which block out particular wavelengths, allowing certain chemical components to stand out from their surroundings. The camera detects

blood diluted to as little as one part blood in 100 parts water. In tests, the camera was able to make invisible stains and patterns emerge from a background of four different types of fabric, also distinguishing between blood, household bleach, rust, soda pop, and coffee. The camera also successfully detected an invisible watermark that the team printed on a piece of fabric.

"These results indicate that this system could be useful for crime scene investigations by focusing nondestructive attention on areas more likely to be suitable for further analysis," the report states.

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Heather Brooke, Megan R. Baranowski, Jessica N. McCutcheon, Stephen L. Morgan, Michael L. Myrick. Multimode Imaging in the Thermal Infrared for Chemical Contrast Enhancement. Part 3: Visualizing Blood on Fabrics. Analytical Chemistry, 2010; 82 (20): 8427 DOI: 10.1021/ac101107v