

Tool to visualize bloodstains created by chemistry researchers

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Chemists at the University of South Carolina have developed a camera with the ability to see the invisible – and more.

The new technology, called multimode imaging in the thermal infrared, could eventually be used in crime-scene investigations, since it can capture [blood](#) stains that the human eye can't see.

Drs. Stephen Morgan and Michael Myrick, professors in the department of chemistry and biochemistry in USC's College of Arts and Sciences, published their work in a series of three reports in the American Chemical Society's [Analytical Chemistry](#), a semi-monthly journal. Graduate students Heather Brooke, Megan Baranowski and Jessica McCutcheon were also authors of the study.

“Detecting blood is like the holy grail of forensics,” Morgan said. “When you are able to detect blood at a crime scene, you know something bad has happened.”

Blood detection is important at a crime scene because blood can be typed and can provide DNA, and pattern analysis of blood spatter may be able to help determine the sequence of events, he said.

He said the luminol test, which is now widely used to detect blood stains and other body fluids at crime scenes, has several disadvantages. Luminol is potentially toxic; it can dilute blood solutions below levels where DNA can be retrieved; it can cause blood spatter patterns to

smear, and it can produce false positive results.

Using the camera means that the surface doesn't have to be changed in any way while it is being examined. "With this, we view the scene without touching it," Morgan said.

Morgan and Myrick built and tested a camera that 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. One of the chemicals it can identify is blood, even when it is diluted to as little as one part blood in 100 parts water.

The system they designed enables the camera to detect contrasts, thus making invisible stains and patterns emerge from a background of four different types of fabric. It can also distinguish whether the stain was made by substances such as blood, household bleach, rust, soda and coffee.

"This technique can be used to detect a contrast for any surface stain," Morgan said, adding it would have other possible forensic and industrial applications.

"The advantage is we can identify a spot where there is blood and then do confirmatory tests and DNA tests," he said.

Morgan said more tests are needed before the camera finds its way to crime scenes.

"This is not next week's CSI tool," he said. "We still have to do

validation studies and real-world studies.”

Provided by University of South Carolina

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