## D50 Two Portable Infrared Detectors: A New Method for Crime Scene Examinations

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After attending this presentation, the attendees will: (1) learn the results of experiments; (2) view a live demonstration with the two devices used; (3) be provided a detailed introduction of the digital viewer in terms of the four light sources, micro digital measurements, and nine geometrical formats; (4) understand the portable feature with a laptop via a USB and with a projector via a VGA cable; and, (5) see magnification choices.

This presentation will impact the forensic science community by showing how the digital viewer may promote current optical technology to be more reliable and valid instruments for both qualitative evaluations and quantitative measurements.

The majority of current forensic examinations rely heavily on chemical, biological or physical methods to detect, develop, and visualize latent evidence. One of the disadvantages of the three methods is their destructive effects during the examination process. In recently years, optical methods have gradually gained attention as the first or recommended selection, especially with a limited amount of evidence. Among the common optical sources, portable UV, polarization, laser, X-ray, or multi-light sources devices (technology) have been developed and employed for forensic examinations. From years in the field and research experiences, four observations on optical equipment can be summarized. First, due to certain technical obstacles, portable infrared devices have been missing from the market. Second, except for IR cameras, most IR devices are not capable of taking digital images for storage or transmission. Third, available optical devices rarely provide any quantified measurements during an examination. Finally, certain cameras with limited IR functions are very expensive, making it unrealistic equipment to purchase and difficult to operate. The four observations clearly suggest our technical challenges for optical equipment: portability, digitability, and quantitability. These three premises are also part of criticisms or challenges from the 2009 National Academy of Sciences Report, "*Strengthening Forensic Science in the United States: A Path Forward.*"

To address the challenges, a joint research project was initiated between the U.S. and China in early 2011: Examinations with Portable Infrared Detection: A Comparative Approach. Two types of IR devices are utilized: An IR flashlight (850 nm) and a digital viewer (near IR). Three test designs (before-and-after) are employed: (1) detection of bloodstains on four types of fabric surfaces (red cotton sweater, red polyester socks, red polyester carpet, and black cotton socks) by different time intervals; (2) detection of bloodstains on a kitchen knife at different time intervals; and, (3) detection of ink writings (five different pens) for potential handwriting traces in four situations (added writing without crossing, added writing with crossing, indented writing, and charred writing).

It is argued that the digital viewer has met three unique challenges for optical equipment: being portable, digital, and measurable. The device has four portable light sources of infrared, black/white, UV, and polarized lights. It also can provide nine different geometrical measurements simultaneously: (1) line; (2) continuous line; (3) polygon; (4) radius circle; (5) diameter circle; (6) three points circle; (7) three points arch; (8) three points angle; and, (9) four points angle.

Testing its further applications in a police debriefing room, in the lab for a supplemental/verification examination, or in the DA's office is strongly encouraged to colleagues. In particular, this study suggests a possible utilization during an expert testimony in court. This palm-size device can provide an effective live demonstration in court to the jury with straightforward digital images and geometric measurements of known and unknown samples. Finally, this new device should be considered to be a great tool in teaching forensic science in classrooms.

**Digital Viewer, Infrared Flashlight, Micro Digital Measurements**

 