

APPLICATIONS OF IR AND RAMAN SPECTROSCOPY TO FORENSIC SCIENCE. Marten Seeba<sup>1</sup>, Di Yan<sup>1</sup>, Antonia Franziska Eckert<sup>1</sup>, Felix Fromm<sup>1</sup>, and **Peter Krygsmann**<sup>2</sup>, <sup>1</sup>Bruker Optics Ettlingen, Germany; <sup>2</sup>Bruker td., Milton, ON, Canada.

A long history exists of using vibrational spectroscopy to provide a better understanding of materials collected from sites and taken to the lab and, more recently, where they exist in the environment. In the case of Forensic investigation, particularly InfraRed (IR) and Raman spectroscopy, are well established as important tools for evidence characterization. These spectroscopies are also important to support and inform emergency responders and site management decisions. Bruker's mobile tools for IR and Raman spectroscopy can be deployed to the evidence location. Examples are the BRAVO hand-held Raman system, the MOBILE-IR and ALPHA II IR, plus lesser known but well-developed open path gas analysis instruments, the SIGIS II and OPS gas analysis tools. Spectroscopy in the field can then be supported by careful evidence sample collection and in-depth measurements in the forensic lab using typical FT-IR and Raman systems including microscopes coupled with these spectroscopies. Acceptable sample collection, handling, and preparation for analysis are important for evidence chain of custody and integrity. Reference materials and spectroscopy libraries are important for understanding the evidence. Complicated samples like paint chips are best investigated with microscopes that provide excellent visual documentation and micron scale spectroscopic identification, for example the LUMOS II FT-IR microscope and SENTERRA II Raman Microscope. New developments in these technologies are emerging and more are coming soon. For example, recently developed hybrid IR microscopy combines quantum cascade IR laser sources with typical broadband IR sources. Bruker's Hyperion microscope has both IR sources and now can be added to the tools available to the forensic laboratory.