



E75 Discrimination Between Human and Animal Blood by Attenuated Total Reflection/Fourier Transform Infrared (ATR/FTIR) Spectroscopy for Forensic Purposes

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Learning Overview: After attending this presentation, attendees will gain knowledge about: (1) the limitations of current methods for bloodstain analysis during forensic investigation; (2) the importance of species identification from blood traces found at a crime scene; (3) the significance of a non-destructive method for examination of trace evidence at a crime scene; and (4) the advantages of FTIR spectroscopy in forensic investigation. The goal of this presentation is to disseminate results of FTIR spectroscopy for bloodstain examination as well as the results of chemometrics for distinguishing between human and animal blood.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by disseminating results of the non-destructive and rapid discrimination between human and animal blood at a crime scene immediately after discovering a crime scene.

Bloodstain identification is one of the most essential aspects of forensic casework involving violence. Presumptive tests can be used for unveiling the presence of blood. Unfortunately, false positive results may be obtained from substances other than blood. Subsequent DNA profiling can be performed to compare the profile with those in a DNA database. This can waste time, money, and other resources if the DNA was obtained from a stain of non-human origin, in cases where human DNA was of intention. Therefore, another very important step of forensic casework is the identification of origin of a stain: human or non-human blood. Discrimination between species can be especially critical in hit-and-run incidents for confirming suspect's testimony whether an animal or a human was involved in an event. Therefore, having a reliable method for non-destructive species identification from a bloodstain would be extremely beneficial and would save time, money, and other resources.

This study proposes the use of ATR/FTIR spectroscopy for identification and characterization of bloodstains. Specifically, this technique in combination with advanced statistical analysis, showed promise for differentiating between human and non-human blood traces from a pool of forensically relevant species. The statistical modeling demonstrated high prediction accuracy of bloodstains from unknown samples. The great advantage of this technique is its non-destructive nature, which makes it practical for forensic applications. The non-destructive examination can be performed on the same sample using ATR/FTIR spectroscopy and subsequent DNA analysis. Commercially available portable instruments make on-scene examination possible. Rapidly obtained results on scene give the great benefit of saving time, money, and other resources combined with immediate results during the first, critical hours of a criminal investigation.

Bloodstains, Human Origin, Non-Destructive Analysis