

# The Interpretation of Body Fluid Mixtures Using Raman Spectroscopy in Forensic Investigations

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## **Abstract**

return the tube. After samples were returned, they were stored at 4 C for the duration of the study.

## **2.2 Materials and Methods: Sample Preparation**

All samples were prepared on aluminum-wrapped glass microscope slides as shown in **Figure 1**. The slides were wrapped in aluminum foil to prevent fluorescence from the glass causing interference during analysis. For the individual fluids, 10  $\mu$ L were taken from the body fluid sample and pipetted directly onto the slide or onto the fabric substrate being tested. The two substrates used in this study were black and white cotton from two different Hanes brand t-shirts. For the mixtures, 20  $\mu$ L were prepared in varying ratios and then placed onto the slide or substrate. Six different mixtures were prepared: blood and semen, blood and saliva, blood and urine, semen and saliva, semen and urine, and saliva and urine. Two mixed samples of each mixture type were prepared in equal ratios, one sample with the fluids in a 1:4 ratio, and one with the same ratio, but with the major contributor to the mixture switched. All of the samples were prepared under sterile conditions, and were allowed to dry overnight before Raman analysis.

**Figure 1:** An example of a slide used in this project. The red circles represent the fluid samples. The magnified area shows an example of the typical pattern followed for the sampling areas during Raman analysis.

## **2.3 Materials and Methods: Raman Spectroscopy**

All of the samples prepared were analyzed using a Thermo Scientific DXR Raman Microscope. The microscope was equipped with a 10X objective and the Thermo Scientific OMNIC™ Software. The laser was kept at a constant power of 10 mW and a constant wavelength of 780 nm throughout the duration of the project. The aperture used was a 50  $\mu$ m slit, and the grating was 400 lines per mm. A polystyrene standard was run every day prior to any samples being run to check the alignment and calibration of the machine. The sample exposures were kept constant at five 20-second

**Figure 3:**



## **7 Acknowledgments**

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## **8. Biography**



Tyler Schlagetter of Sidney, Ohio is a Junior Forensic Science and Biology double major with a concentration in Biochemistry. Currently enrolled at the University of New Haven, he is a teaching assistant for the Cell Biology laboratory. Upon graduating, he plans to either go into work at a crime lab, or continue research to further improve the field of forensic science.