Raman Spectroscopy for the Detection and Identification of Oral Fluid Stains on Common Substrates

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Body fluid traces found at a crime scene serve as a key source of DNA evidence. Raman spectroscopy has attracted significant interest in forensic applications because of its ease of use, quick analysis, and non-destructive nature. Particularly, it has proven to be remarkable in identifying body fluids. However, biological stains are often found on interfering substrates that limit the practical use of this technology. To overcome this limitation, we have developed an approach for the analysis of oral fluid stains on different substrates. Oral fluid was deposited onto glass, plastic soda bottles, rubber, and clear plastic baggies to simulate the oral fluid stains that might be found as evidence. Raman spectra were acquired from the stains using 785 nm laser excitation, with measurements collected across different regions of each stain. Our results indicate that this approach can be effectively applied to detect traces of oral fluid on various substrates, particularly homogeneous surfaces, using simple chemometric methods. When fully developed, this approach could be applied in forensic investigations to detect traces of oral fluid on homogeneous substrates.