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REAL-TIME DETECTION OF GSR PARTICLES FROM CRIME SCENE: A COMPARATIVE STUDY OF SEM/EDX AND PORTABLE LIBS SYSTEM

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Highlights

- Simultaneous detection of Sb, Pb and Ba is necessary to GSR positive results by LIBS
- The particle size had to be greater than 1µm to be detected by LIBS
- Particles of size> 2µm weren't completely ablated and can be re-analyzed by SEM/EDX
- A sensitivity of 100% was obtained for samples with a number of particles ≥3
- The comparative study demonstrates the capacity of iForenLIBS in the detection of GSR

ABSTRACT

The use of modern technologies that can help optimise the collection of evidence that contains Gunshot Residue (GSR) from crime scene investigation leads to obtaining better results in forensic laboratories. With this objective, equipment based on LIBS (Laser Induced Breakdown Spectroscopy) technology has been developed named iForenLIBS. This study intends to evaluate the effective capacity of the aforementioned system. To do this, results were gathered from the analysis of real samples using LIBS equipment and were compared to those obtained by way of Scanning Electron Microscopy/Energy Dispersive X-ray Spectroscopy (SEM/EDX) in the laboratory. The system has verified its capacity to analyse GSR particles through simultaneous detection of the three characteristic elements of ammunition used (Sb-Pb-Ba) even in stub where only a single particle was found.

Keywords: LIBS, SEM/EDX, GSR Particles, Forensic analysis, Portable system.

1. INTRODUCTION

In the course of a crime scene investigation, most of the cases in which firearms are involved, bullets, cartridge cases, projectile fragments and evidence from firearm discharge residues are collected. This evidence is analyzed in forensic laboratories in order to provide valuable investigative information: to identify a potential shooter, to determine firing distances, or to make a difference between a potential