

## Symposium J

POSTER SESSION PJ1 - WEDNESDAY OCTOBER 11

### J503 - PRELIMINARY SEM/EDS DATABASE OF GSR FROM BRAZILIAN AMMUNITION

Magali Lima Brito (DPT), André Luiz Pinto (IME), Andrea Martiny (IME) and Jorge Borges dos Santos (DPT)

Gunshot residues from the muzzle plume and hand deposits of 11 different caliber cartridges produced in Brazil by Companhia Brasileira de Cartuchos (CBC) for pistols, revolvers, shotguns and rifles were examined by scanning and transmission electron microscopy/Energy dispersive spectrometry in order to build a database of Brazilian GSR. Such database may be helpful in discriminating GSR in crimes committed with different firearms and/or ammunition.

### J504 - SEM/EDS DETECTION OF GSR ON COTTON SWABS

André Luiz Pinto (IME), Jorge Borges dos Santos (DPT), Denilson Soares de Siqueira (ICCE) and Andrea Martiny (IME)

Investigation of deaths due to firearms is a common task for law enforcement and medical examiners. Both contribute to the distinction between suicide and homicide by autopsy findings and trace evidence. During firearm discharge, the burnt primer escapes through the weapon openings as a vapor which solidifies into small particles denominated gunshot residues (GSR). Sampling of GSR on the hands can be made using tape lifts for SEM analysis or swabs for chemical tests. Since SEM stub kits are not available in Brasil, we aimed to study the possibility of analyzing cotton swabs by SEM/EDS.

### J505 - SEM AND LIGHT MICROSCOPY ANALYSIS OF TEXTILE FIBERS

André Luiz Pinto (IME), Marcia Attias (IBCCF-UFRJ) and Andrea Martiny (IME)

Fiber structure can be used as evidence in forensic investigation. Synthetic, natural, scissor cut or mechanical tearing, yarn texture and pattern can be used as proof in several kinds of investigation, wether criminal or not.

### J507 - A PRELIMINARY STUDY OF GUNSHOT RESIDUE PARTICLES FROM ENVIRONMENTAL OCCUPATIONAL USING SCANNING ELECTRON MICROSCOPE WITH EDS X-RAY DETECTOR (SEM/EDS)

Patrícia C. Pena (UFMG), Eduardo Auharek (IC-MG), Washington Xavier Paula (IC-MG) and Dagoberto B. Santos

Firing a weapon produces combustion of the primer and powder of the cartridge. Nowadays, the elemental composition of the primers presents lead, barium and antimony. The particles containing these metals can be encountered in different environmental occupational. Scanning electron

microscopy with energy dispersive spectroscopy (SEM/EDS) has been used in the determination of the metals.

### J508 - FRACTURE MECHANISMS CRITERIA FOR CORTICAL BONE

Itamar Ferreira (Unicamp), Beatriz Cesar (UFPR) and Maria Loffredo (Unicamp)

Tested specimens of cortical bone were analyzed by SEM to characterise its fracture mechanisms. Fractographs of the surface fracture area shows clearly the influence of the microstructures of bone on crack propagation and its failure.

### J509 - THE DETECTION, QUANTIFICATION AND IDENTIFICATION OF GUNSHOT RESIDUES (GSR)

Mauricio Pereira Cantão (LACTEC), Sérgio Luiz Henke (LACTEC), Karla Rattmann Freire (LACTEC) and Jandira Bolda (IC-PR)

There were made surveys of the quantity of GSR particles collected after several gunshots with 38 nominal caliber revolver and semi-automatic 380-AUTO nominal caliber pistol. Samples from 1 to 3 gunshots were collected and quantified. The samples were analyzed with SEM/EDS. The quantity of particles is approximately three times higher in samples that show collection from three shots than in samples collected from only one shot. The investigations indicated some differences in the chemical content and frequency of occurrence of gunshot residue originating from selected types of ammunition.

### J510 - SEM/EDS STUDY ON OCCUPATIONAL GSR-LIKE PARTICLES DERIVED FROM AUTOMOTIVE BRAKE PAD

André Luiz Pinto (IME), Andréa Martiny (IME/UFRJ), Márcia Soares Sader (COPPE/UFRJ) and Carla Woyames Gabriel (COPPE/UFRJ)

This work investigated the presence of occupational particles similar to gunshot residues in brake pads from 4 brands available in Brazil, using Scanning Electron Microscopy/Energy Dispersive Spectroscopy technique. Results were compared with the ones previously obtained in wear dust generated during friction of brake pads, aiming to provide a data bank to crime investigation laboratories.

### J511 - IDENTIFICATION OF GSR BY SEM/EDS TECHNIQUE AFTER RHODIZONATE TEST

André Luis Pinto (IME), Andrea Martiny (IME), Jorge Borges Santos (Polícia Técnica da Bahia), Lidia Agata Sena (Inmetro) and Carlos Alberto Achete (Inmetro)

Gunshot residue (GSR) evidence is one of the most common and most heavily examined sources of trace evidence in violent crime investigations. The most common and widely acceptable collection method is tape lifting for scanning electron microscopy (SEM). In this work we tried to verify if SEM/EDS techniques able to be carry out to identify GSR after the sodium rhodizonate test. The results obtained suggest that it may be feasible to recover GSR from filter paper adhered tapes. The major problems of this methodology: maximize extraction of possible GSR and the time consuming manual search.

## **J515 - RECOVERING STAMPED SERIAL NUMBERS OF FIREARMS: THE ROLE OF MICROSCOPY, ILLUMINATION AND POLISHING**

Vilma Jorge Abib (Inst. Crim. Carlos Éboli), Paulo Acioly Marques dos Santos (Inst. Física - UFF), Andrea Porto Carreiro Campos (Dept. de Polícia Técnica), Ladário da Silva (Escola Naval) and Carlos Alberto Braga Mendes (Inst. Crim. Carlos Éboli)

Acid etching is a traditional and successful method for recovering stamped serial number of firearms. The success of this method is based on the fact that "cold working" produces permanent deformation and also depends on the removal depth. Many firearms examined by forensic experts of Rio de Janeiro State are have removal depth less than 1, allowing the recover serial number with the aid of a comparison microscope coupled to a video-camera, a monitor, a portable video grabber connected to a notebook, appropriate illumination with cold light, and polishing. We show this procedure in this work.

## **J516 - EAR AND NASAL SECRETION EVALUATION IN FORENSIC SCIENCE**

Rita de Cássia Siqueira Pestana (UENF), Bárbara Coelho Barbosa da Cunha (UENF) and Flávio Costa Miguens (UENF)

Forensic science may be defined as the application of various scientific disciplines to aid the criminal justice system. GSR are very durable particles composed of heavy metals that originate from the primer cap of the ammunition. The detection of lead (Pb), barium (Ba) and antimony (Sb) is therefore suggestive of GSR. The SEM/EDS can tie of Pb, Ba and Sb to a single particle. In this paper, we analyze ear and nasal secretion in forensic science, particularly for GSR detection.

## **J519 - SOIL SAMPLE PREPARATION FOR X-RAY DIFRACTOMETRY**

Lise Cary (ESALQ/USP), Antonio C Azevedo (UFSM), Ricardo Espíndola Romero (UFC), Sérgio Luís Jesus (ESALQ/USP) and Virgílio Nascimento Filho (CENA/USP)

In order to describe a soil the first tools are our human feelings which will enable to evaluate its color, texture and even its odor. These observations will give clues to the use of more precise and costly techniques. Its characterization are a powerful argument to relate the presence of suspicious one to the scene of committed crime and, consequently, to the victim. This work aims to present preparations of soil samples for analysis by X-ray diffraction and scanning electronic microscopy attached to X-rays fluorescence analysis in the evaluation of clods of samples and fragments of soils

## **J521 - TEM ANALYSIS OF NANOPARTICLES GENERATED FROM BRAZILIAN AMMUNITION**

Guillermo Solórzano (PUC - RIO) and Andrea Porto Carreiro Campos (DPTC - RJ)

Gunshot residues (GSR) analysis is nowadays a routine examination in many forensic laboratories all over the world. The most commonly chosen method involves Scanning Electron Microscopy/Energy Dispersive Spectroscopy (SEM/EDS) systems. However, only few works have been reported as using Transmission Electron Microscopy (TEM) within this field of research. In the present work, we propose to use systematically TEM in order to fully

characterize GSR particles generated from the most common Brazilian ammunition found in scene crimes at Rio de Janeiro State.

## **J527 - IDENTIFICATION OF GUNPOWDER RESIDUES GENERATED BY GUNSHOTS**

Miriam Aparecida Garavelli (Inst. Criminalística - SP), André Paulo Tschiptschin (USP - Eng. Metalúrgica) and Clarice Terue Kuniochi (USP - Eng. Metalúrgica)

The distribution of gunpowder residues generated by gunshots of a Taurus .38 handgun was studied. Gunpowder particles were collected on a fabric which was on top of the target. Two shooting distances were used: 50 cm and 100 cm. Carbon tape was used to collect the residues, which were photographed and chemically analyzed in a SEM using EDS spectrometry. Pb and Pb/Sb spherical particles and Ba irregular particles were observed. Some other particles containing solely carbon and oxygen were also detected. In the region near the perforation, Pb particles predominate. In more distant regions particles containing C and O were observed. Increasing the shooting distance resulted in a more sparse distribution of particles although no changes in the distribution of Pb, Ba and C + O particles could be observed