I.A.M.A.
International Association forMicroAnalysis

September 28, 2001
Volume 2 Issue 2

THIS ISSUE IS DEDICATED TO THE BRAVE MEN AND WOMEN WHO LOST THEIR LIVES IN THE NAME OF AMERICAN FREEDOM.

Inside This Issue

Special Points of Interest:

- **SWAFS 2001 Conference in San Antonio**
- ***NEW* IAMA Committee Members**
- **ESEM Forensic Applications**
- **Letter to the Editor**
- ***NEW* SEM Stub Design**

The Perfect Chamber Scope

To create a perfect chamber scope, a trained microscopist uses a scanning electron microscope (SEM) to produce a mirrored reflection of the chamber when a beam of high-energy electrons scans a sample. Illuminating a nonconductive sample with an electron beam allows for the localization of the negatively charged electrons to accumulate within the sample. This prevents the normal emission of secondary electrons from the sample, a phenomena known as "charging". If the sample is allowed to acquire a sufficiently high charge it can act to decelerate the primary electron beam creating an electron mirror. This mirrored reflection can then be used to inspect the chamber environment and detector conditions while under normal operating parameters.

It should be mentioned that before performing this exercise, it is important to choose a sample that is properly prepared, securely mounted and does not fragment from thermal or radiation damage caused by the primary electron beam.

In this exercise, an electron mirror was produced with a nylon screw, which is used to fasten the automated stage assembly of the SEM. The flat surface of the screw reduced abnormal contrast aberrations and/or image deformation making it an ideal candidate. To ensure adequate charging, the accelerating voltage was set to 25 keV and the spot size increased to its maximum diameter (adjustments of the spot size or its function may vary depending on the instrument manufacturer). The spot size was then decreased by approximately 50% and the accelerating voltage slightly dropped (20 keV), just enough to prevent additional charging of the sample and thereby creating the electron mirror. Adjustments were made to the brightness/contrast controls, magnification and fine focus to obtain the best mirror resolution.

In conclusion, a perfect chamber scope is nothing more than creating an electron mirror from a nonconductive sample. The theory is not new, but in an age of computer automated instrumentation, it's a refreshing look at an effective yet all but forgotten technique from days of old.

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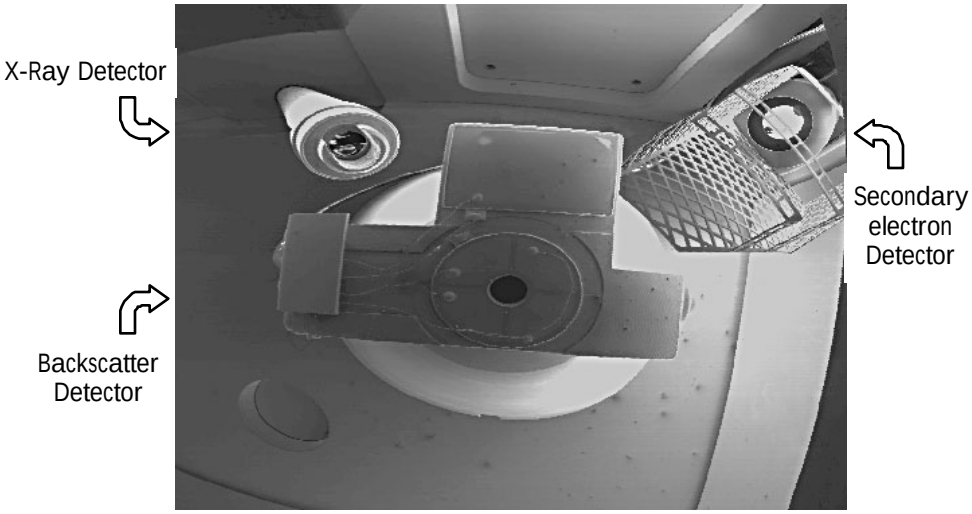
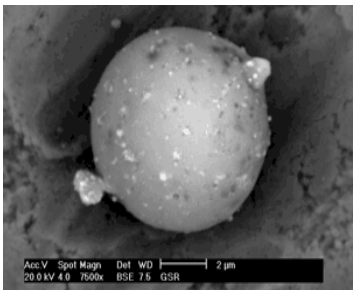


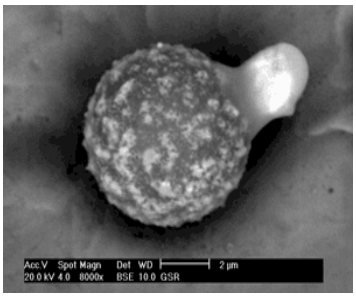
Lead Particles from Non-Firearm Sources



P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory

Here rests his head upon the lap of earth,
A youth to fortune and to fame unknown:
Fair Science frown'd not on his humble birth,
And Melancholy mark'd him for her own.

"The Epitaph"
John Bartlett



P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory

A study was undertaken to locate lead used in society and investigate the potential for these sources to create spheroidal lead particles. Occupations, hobbies, and suppliers involving lead were canvassed and samples were obtained. An effort was made to focus on lead that is used at elevated temperatures. This included soldering from both electronic technicians and stained glass artisans; the hands of a person jump starting a car; and the hands of a person handling automotive wheel balance weights and fishing line sinkers. Though the wheel weights and fishing weights do not involve heat during their application it was thought that, residual microtrace particles from their manufacture might still be associated with them.

Spheroid lead was the major particle type identified on the jump start samples. Lead/copper and a few lead/antimony particles were also found. Spheroidal lead/tin particles were found on the samples from solders. Lead spheroids can occasionally be observed. A "lead free" solder product was also examined. The EDS spectra of the particles appear to contain tin. The manufacturer indicates that it contains 95% tin and 5% antimony, however, with the low levels of antimony it could not be seen under the major peaks from the tin (*) as noted on the chart.

Approximately 80 samples were included in this research. This included specimens from storage batteries, automotive wheel weights, fishing sinkers, diving ballast, plumbing, roofing, fire protection, print font, cap foil seals, and wall anchors.

The main question that motivated this study involved the occurrence of lead/antimony/tin particles that are encountered during GSR casework. They are known to be produced by certain ammunition from overseas. This was demonstrated by known cartridge residue supplied as evidence as well as with this undertaking. Lead/tin/antimony particles were located in GSR from Yugoslavian ammunition**.** There were not any sources identified in the non-firearm samples, which yielded lead/antimony/tin particles. **Sources of lead/tin/antimony were located in items #26, #81, and #82. The Sn/Sb signals are about equal to the lead signal in item #26 and they give weak signals in items #81 and #82**. Particles encountered in case work and with known ammunition in this study contains strong signals for tin and antimony but minor amounts of lead. A simulation was attempted by mixing lead free solder wire with lead wire solder 50/50 and melting them together. There were not any lead/antimony/tin particles located. Additional study of this needs to be carried out.

Another particle type of curiosity encountered during GSR casework is lead/calcium/phosphorus and lead/phosphorus. Also lead/titanium/antimony particles are, at times, noted in casework. A source for these particles could not be located during this study. If anyone can offer potential sources of such spheriodal micron size particles, please advise us. **The utility of an x-ray data base such as SLICE (www.xk.com) can be realized for such questioned particles.** The abstract for this study and presentation, "Lead: Lead Us Not Astray", appears in the proceedings issue for Scanning 2001 in *SCANNING, The Journal of Scanning Microscopies;* Vol. 23,3 (2001). A table has been created which details the elements detected for the specimens chosen in the study. The upper case 'X' denotes large signals and the lower case 'x' denotes minor but detectable signals of the respective elements.

(Table continued on page 3)

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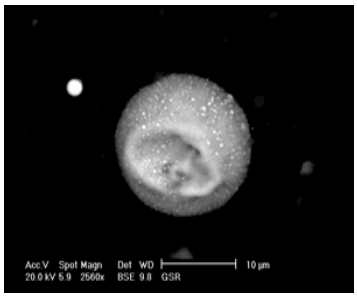
Forensic Laboratory

Lead Particles from Non-Firearm Sources ...*Continued*

Tables: Non-Firearm Items Sampled

Sample #	Pb	Sn	Sb	Other	Uses
1	X	x	x	Spheroid	Jump Start Car
2	X	X			Soldering Residue
3	X			Zn	Chain Link Fence Accessories
4	X				#5 Red Wolf Fishing Sinker
5	X	X			"Dust" Homemade Fishing Sinkers
6	X		X		Wall Anchors
7		X		Cu	Solder
8	X				3/0 Red Wolf Fishing Sinker
9	X	X			Solder
10	X		X		Lawn Mower Battery Post
11				Al	Fence Tire Wire 11 Gauge
12		X		Cu	Solder Dutch Boy Acid Core
13		X		Cu	Solder Dutch Boy Resin Core
14		X		Cu	Solder Dutch Boy Lead-Free
15	X			Ca	Battery Post Storage Cell
16				Fe Zn	Roof Nail Korea
17				Fe Zn	Roof Nail China
18				Fe Zn	Roof Nail Bostitch Coil
19				Zn	Anchor Lag Screw Canada
20				Zn	Anchor Lag Screw Canada
21	X		X		Anchor Drive Nail Canada
22				Zn	Anchor Drive Nail Canada
23	X	X			Solder Red Spool WV DPS
24	X		X		Diving Weight Bean
25	X				Diving Belt Weight 2 lb
26	X	X	X		Recycled Metal "Babbitt"
27	X				Recycled Metal
28	X				DPS Lab Sink Trough Liner
29	X				Pipe DPS Lab Sink Drain
30	X		X		Wheel Weight Standard 1.5
31	X		x		Wheel Weight Red Label 1.25
32	X		x		Wheel Weight Yellow Label 0.75
33	X	X		Cl Zn	Solder Bench Stained Glass
34	X	X		Cl Zn	Metal Saw Dust Stained Glass
35	X	X			Solder 60/40
36	X				Channel Wrap Stained Glass
37	X				Lead Wool
38	X				Lead Block Pipe Joint Seal
39		X		Cu	Solder Lead-Free
40		X	*		Solder Lead-Free 95/5 Sn/Sb
41		X		Cu	Solder
42				Fe	Font Typewriter Remmington
43	X		x		Battery Post
44				Cl Zn	Turned Stainless Roofing
45	X	X			Links Fire Protection

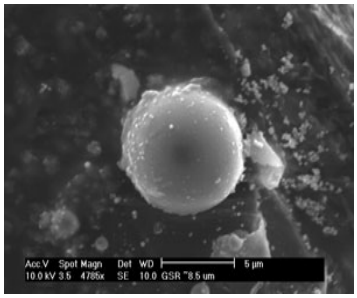
Sample #	Pb	Sn	Sb	Other	Uses
46	X				Anchors
47	X	x	x		Jump Start Auto Battery Residue
48				Zn	Anchor Hammer Set
49				Zn	Anchor Hammer Set
50				Cl	Cap Seal Foil Wine Bottle (blue)
51				Al	Cap Seal Foil Wine Bottle (yellow)
52		X			Cap Seal Foil Wine Bottle (blue)
53		X			Cap Seal Foil Wine Bottle (black)
54	X				Raleigh Scrap
55	X		x		Raleigh Scrap
56	X				Raleigh Scrap
57	X				Raleigh Scrap
58	X				Raleigh Scrap
59	X				Raleigh Scrap
60					Raleigh Scrap
61	X		x		Raleigh Scrap
62	X		x		Exide Battery Post
63	X		x		Exide Battery Post
64	X				TriState Roofing
65	X	X		Fe	TriState Roofing
66				Zn Cu	"L" Link Button
67	X	X			Link 182 C
68				Zn	TriState Wall Anchor (1/2 hole)
69				Zn	TriState Wall Anchor (small)
70				Zn	TriState Wall Anchor (small)
71				Cl	Cap Seal Foil Wine Bottle (gray)
72				Cl	Cap Seal Foil Wine Bottle (blue)
73				Cl	Cap Seal Foil Wine Bottle (blue)
74				Al	Cap Seal Foil Wine Bottle (blue)
75				Cl	Cap Seal Foil Wine Bottle (black)
76	X				Lead Sheet
77				Cu	Sprinkler
78				Cu Zn	Sprinkler 212C
79				Cu Zn	Sprinkler 280C
80				Cu Zn	Sprinkler 165C
81	X	x	x		Linotype
82	X	x	x		Linotype
83	X			Zn	Left Hand- Lead Manufacturing Employee
84	X			Zn	Right Hand- Fork Truck Operator
85	X			Zn	Face – Furnace Assistant
86			X	P Cl K Si Fe	Match Striker Surface
87	X	X	*		Solder Mixture Lead/Lead-Free



P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory

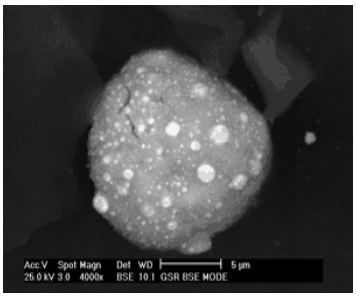
There is a single light of science, and to brighten it anywhere is to brighten it everywhere.

Isaac Asimov



P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory

The "Clean Fire" Ammunition is not so clean



P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory

We tested three types of "Clean Fire"(CF) ammunition. According to the manufacturers CF ammunition is free of lead, barium and antimony. Without those elements present, how are we to detect a classic Gunshot Residue (GSR) that is defined as particles with that composition? Even when lead is considered to be optional for GSR definition, without barium and antimony what might the new definition be? Hopefully, this analysis will tell us.

To our surprise, we found plenty of these elements present in samples collected from the shooter's hand after firing the CF ammunition.

The two handguns, Para-Ordnance P14-45 semiautomatic pistol and Taurus Tracker 357Magnum revolver, were carefully cleaned with solvent, phosphor bronze brush, then electrochemically cleaned and solvent and brush again. The test firing was done at an outdoor range to eliminate possible range contamination.

The following are results from GSR analysis of the samples. Each sample was collected on double sided carbon based tape and without any further preparation, inserted into the microscope for analysis. Each sample was scanned across a 5x5mm area with 0.5 micron resolution. With this setting, particles smaller than 0.5 micron were ignored. Each particle was measured with about 3% precision and the x-ray analysis was set to 5 seconds live time or 5000 counts which ever was reached first. The number of particles analyzed in each sample was between 5000-13000 particles.

In this analysis, the concentration of a given element or compound is expressed as a ratio of area covered by all particles of the same composition to the total scanned area. Normally shown as area percent, but for very small ratio as in the cases shown here, we used parts per million instead. This value is far more accu-

(Continued on page 5)

In solving a problem of this sort, the grand thing is to be able to reason backwards. That is a very useful accomplishment, and a very easy one, but people do not practise it much. In the everyday affairs of life it is more useful to reason forward, and so the other comes to be neglected. There are fifty who can reason synthetically for one who can reason analytically.

"*A Study in Scarlet* "
Sherlock Holmes

Winchester Clean™ WC381 Ammunition:

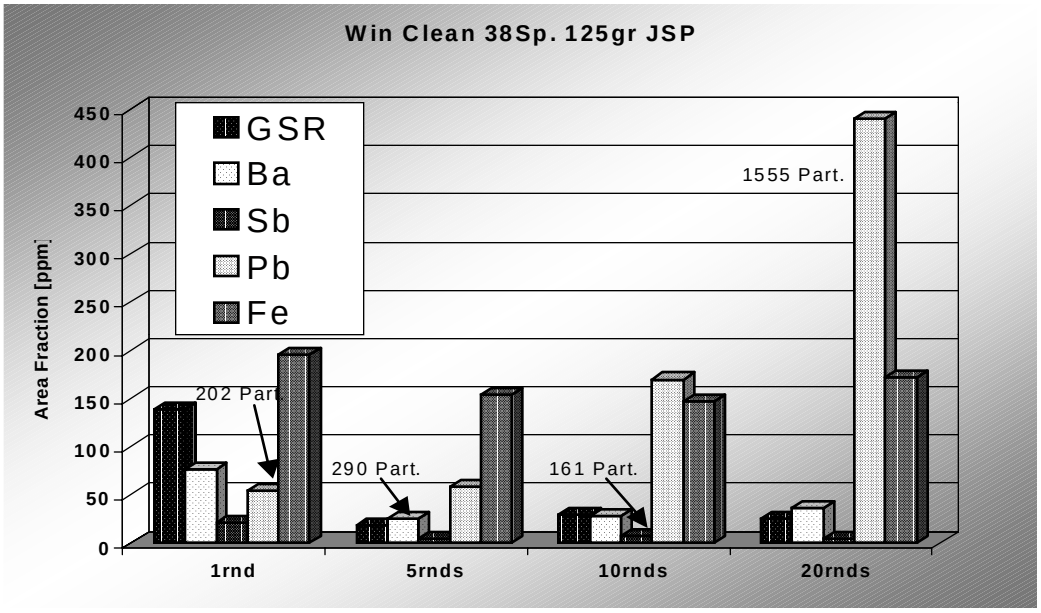


Fig. 1: *Win Clean™ 38 Special The concentration of heavy elements does not appear to be much cleaner than Win Western™ in Fig. 8*

The "Clean Fire" Ammunition is not so clean... *Continued*

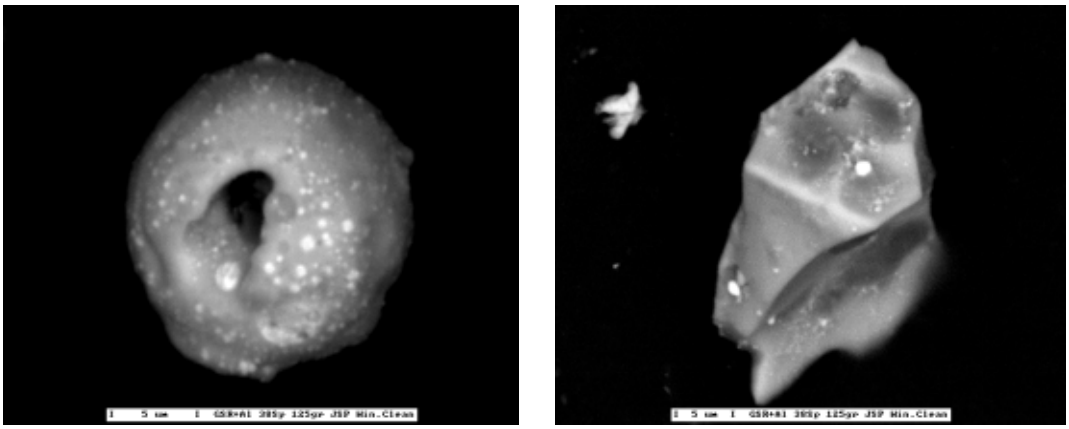
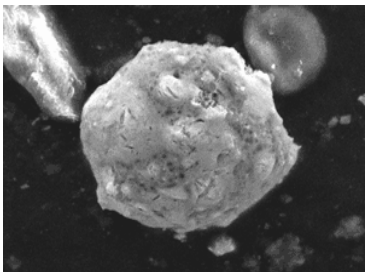


Fig. 2: *Two GSR particles "Win. Clean™" ammunition selected from a set of 33 large ones. The average size is only about 0.9 microns.*



P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory

(Continued from page 4)

rate than a simple particle count since it includes the particle size as well as particle count.

Some of the bars in the diagrams include the actual particle count just to illustrate the particle population. Please note that the number of particles does not always follow the concentration or the height of a given bar. This is because the particle count alone does not tell us anything about the size distribution.

The relatively high lead concentration may be explained by the construction of the Jacketed Soft Point (JSP) bullet. The front of the bullet is not jacketed and the lead core is exposed. Thus the "soft point." The CCI Blazer CF® features "Total Metal Jacket" resulting in a signifi-

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Winchester "Super Clean" NT™ 38 Special Ammunition:

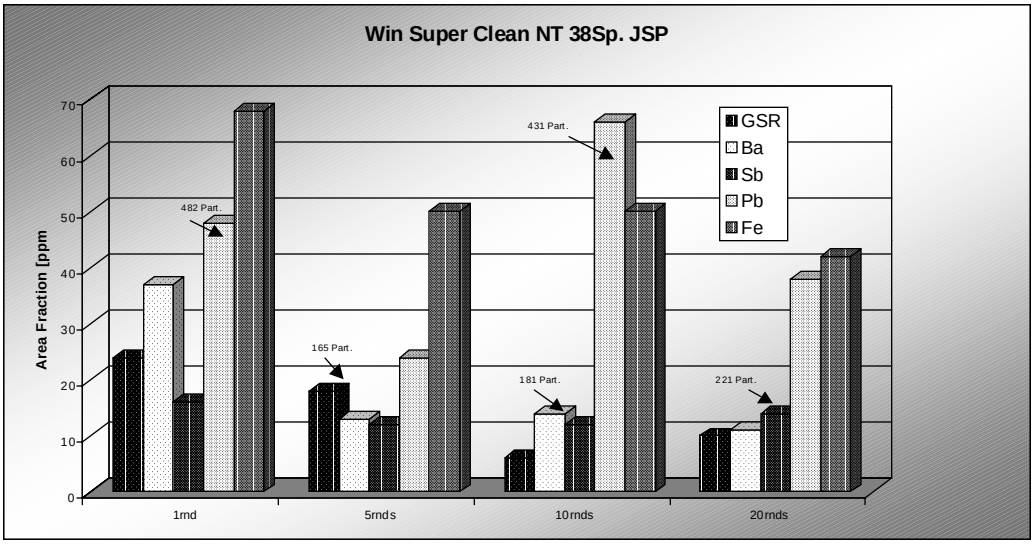
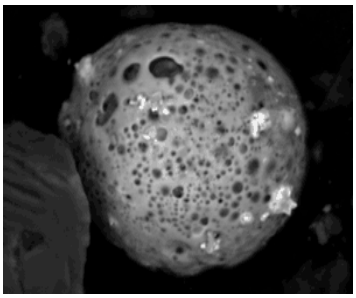


Fig. 3: *A much cleaner Win Super Clean NT™ [for Non Toxic]. Note the change in the vertical scale.*

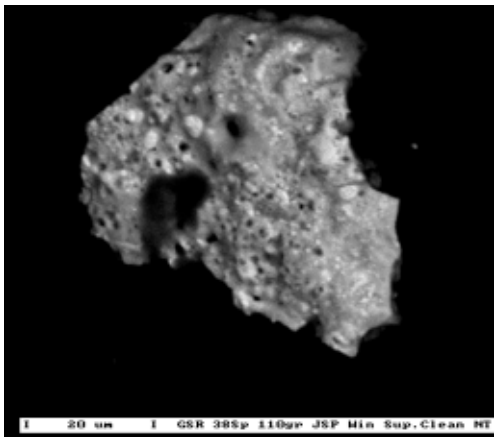
Even if there is only one possible unified theory, it is just a set of rules and equations. What is it that breathes fire into the equations and makes a universe for them to describe? The usual approach of science of constructing a mathematical model cannot answer the questions of why there should be a universe for the model to describe. Why does the universe go to all the bother of existing?

Stephen W. Hawking

The "Clean Fire" Ammunition is not so clean... *Continued*



P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory



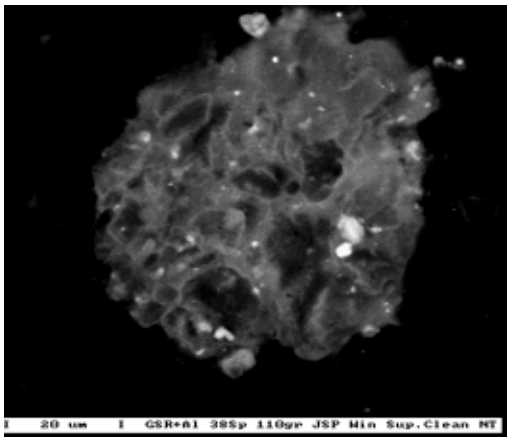
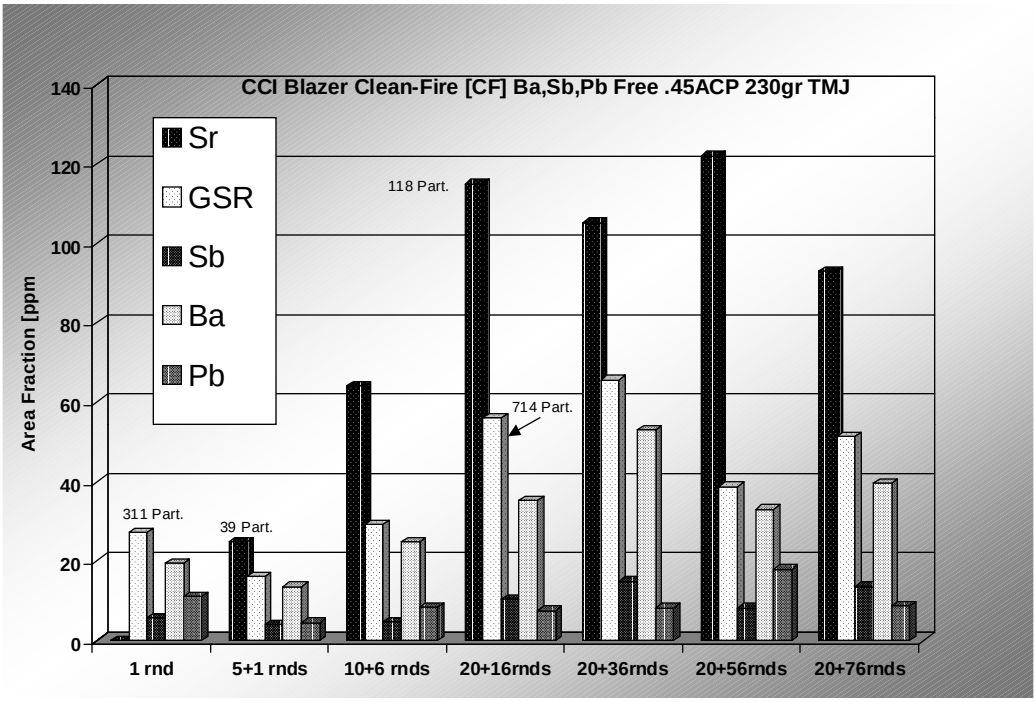


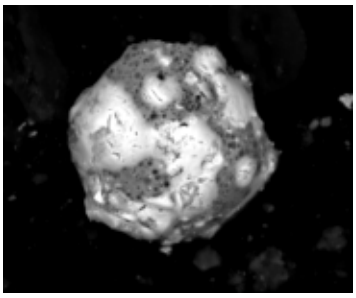
Fig. 4: *Two large GSR particles from " Win Super Clean™ " ammunition.*

For every human problem, there is a neat, simple solution; and it is always wrong.

Mencken's Metalaw

CCI Blazer "Clean Fire®":





P-GSR particle
Complements of David Flohr,
U.S. Army Crime Laboratory

Fig. 5: *This is the cleanest ammunition tested. The low lead concentration is mostly due to the "Total Metal Jacket" bullet and lead free primer. One of the primary elements in this CF primer is strontium. Note the Sr increase with number of rounds fired until it settles around 100 ppm after 36 rounds. The lead stays fairly constant regardless of the number of rounds fired while the GSR, Ba and Sr also increases until it stays constant after 36 rounds. If we assume that the heavy elements originated from less than perfectly clean guns, we would expect their concentration to decline with number of rounds fired.*

The "Clean Fire" Ammunition is not so clean... *Continued*

(Continued from page 5)

cantly lower lead concentration. See fig. 5.

A typical GSR analysis in fig.8 of 9 mm ammunition demonstrates concentrations of heavy elements expected from what is ***not*** claimed to be "Clean Fire" type.

The above results indicate that the cleanest ammunition is the CCI Blazer CF® 45ACP, followed by Win Super Clean™ 38 Special, while the Win Clean™ 38 Special is not much different from standard ammunition.

The concentration of GSR particles in the cleanest ammunition is still high enough to be reliably detected. For the present, we don't have to worry about the problem of detecting GSR from the so-called "clean fire" ammunitions.

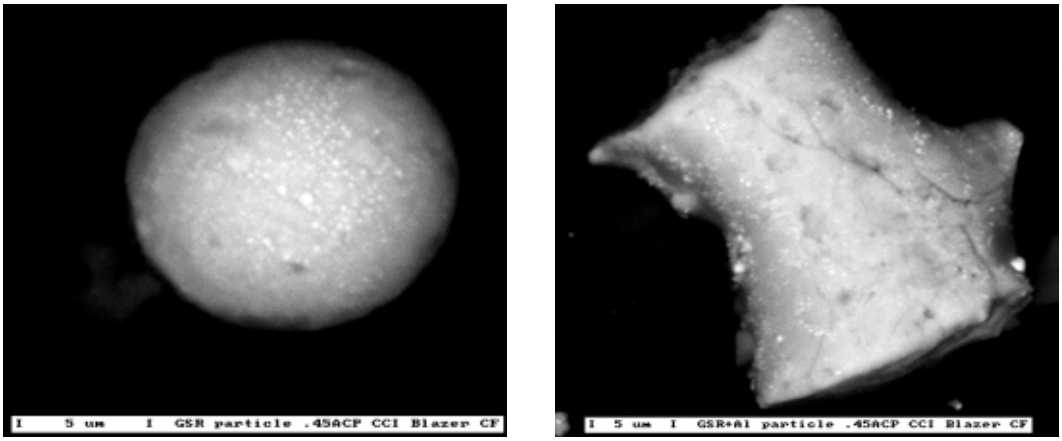


Fig. 6: *GSR particles found in CCI Blazer CF® Ammunition.*

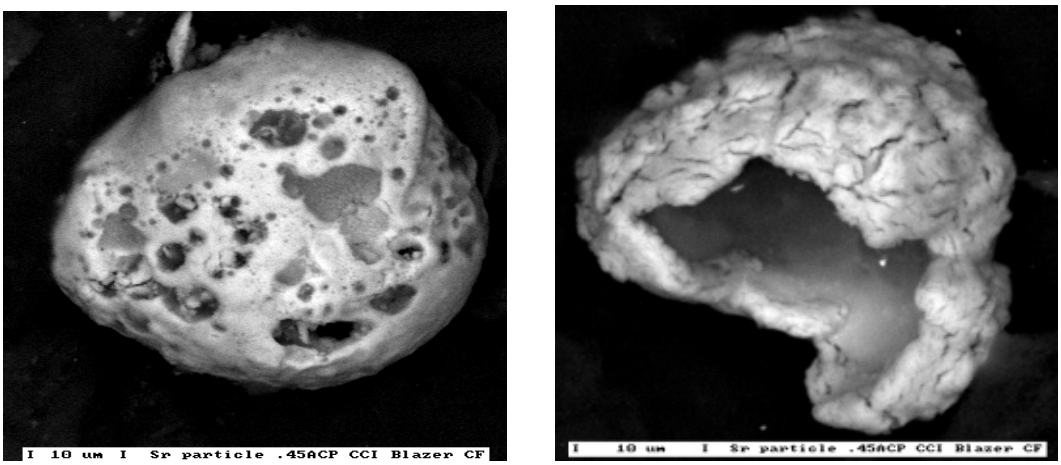


Fig. 7: *More interesting strontium particles found by the GSR analysis from CCI Blazer CF® sample. Most of the Sr particles were spheroids quite larger than the GSR particles. The average diameter was found about twice the GSR particles [1.8-2.0 micron].*

Forensic Science Personal Web Pages

Zeno's Forensic Site
by Zeno Geradts
http://forensic.to/forensic.html

Forensic Science
by Mike Martinez
http://home.satx.rr.com/forensic/

Carpenter's Forensic Science Resources by R. Scott Carpenter
http://www.tncrimlaw.com/forensic/

Crimes & Clues
by Daryl W. Clemens
http://crimeandclues.com/

Deans Forensic Web Page
by Dean Fetterolf
http://members.prestige.net/dfettero/home.html

Forensic Science Web Pages
http://home.earthlink.net/~thekeither/Forensic/forsone.htm

FirearmsID.com
by Jeffrey Scott Doyle
http://www.firearmsid.com/index.html

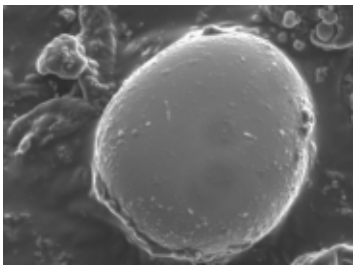
Reddy's Forensic Page
by Reddy P. Chamakura
http://www.forensicpage.com/

Crippin's Place
by James (Jamie) Crippin
http://members.home.com/jcrippin/

Evidence The True Witness
by The students of Windsor High School, CA
Glenunga International High School, Australia
http://library.thinkquest.org/17049/

Law Office of Kim Kruglick
http://www.kruglaw.com/forensic.htm

The "Clean Fire" Ammunition is not so clean... *Continued*



Lead, Barium and Antimony
IAMA Collection

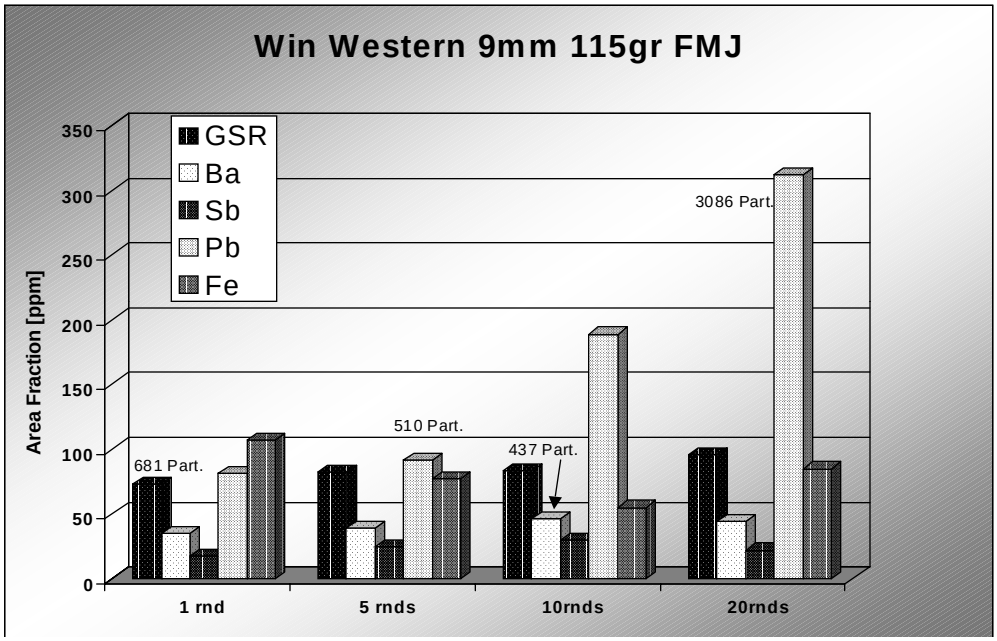


Fig.8: Typical GSR analysis of "not clean" Win Western® 9 mm FMJ ammunition. Note that lead concentration from this ammunition is about the same as "Win Clean™" ammunition.

If it weren't for my lawyer, I'd still be in prison. It went a lot faster with two people digging.

Mister Boffo

(Continued from page 7)

However, this may change when a truly clean type comes on the market.

We tested only three types of "clean" ammunitions that are easily available over the counter and any conclusion based on this limited study must be viewed as only preliminary and limited.

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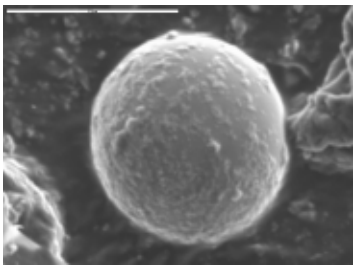

Lead, Barium and Antimony
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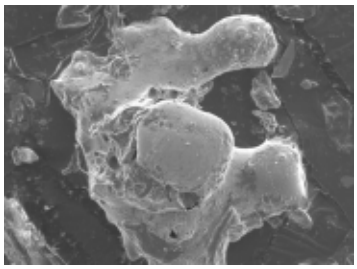
New ASTM Standard Guide for Gunshot Residue Analysis by Scanning Electron Microscopy/Energy-Dispersive Spectroscopy

ASTM committee is currently in the process of soliciting information to update the current Guide 1588-95 "Standard Guide for Gunshot Residue Analysis by Scanning Electron Microscopy/Energy-Dispersive Spectroscopy." JoAnn Buscaglia, of the FBI Laboratory Forensic Science Research Unit and Bill MacCrehan of NIST (the National Institute of Standards and Technology) are heading a task group looking for comments on the current guide. Specifically, we hope to add elements that address GSR characterization using new software-controlled selection of candidate particles and also to provide guidance on "lead-free" types of primer formulations. Another issue of note is possible occurrence of GSR-like particles from environmental and occupational exposure. For example, at the Spring 2001 meeting of the AAFS in Seattle, Michael Trimpe of the Hamilton County Coroner's Lab in Cincinnati showed some interesting results on GSR-like particles from certain types of fireworks containing compounds of lead, barium, and antimony. Although no "unique" (containing Pb, Ba, and Sb) particles were found, of 65 fireworks tested, 10 contained particles of Pb and Ba and one contained Pb and Sb in the size range and shape anticipated for GSR.

If you have any comments to help make E1588-95 more useful to you work, please contact

Bill MacCrehan
(301) 975-3122.
or
JoAnn Buscaglia
(703) 632-4553
jbuscaglia@fbiacademy.edu



Lead, Barium and Antimony
IAMA Collection

Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world. Science is the highest personification of the nation because that nation will remain the first which carries the furthest the works of thought and intelligence.

Louis Pasteur

Forensic Applications of an ESEM

ABSTRACT

ESEM stands for Environmental Scanning Electron Microscope. It is new type of SEM that can work in three modes of operation: High Vacuum Mode (~10^{-6} Torr), Low Vacuum Mode (0.1-1 Torr) and ESEM Mode (1-50 Torr). This allows us to perform GSR analysis on samples of biological origin (garment made of wool or cotton, pieces of human tissue, leaves, branches, wood,…) in their natural state (without any coating) in spite the fact they are non-conductive, oily, dirty, wet or out gassing. Article describes several topics and methods of work in High Vacuum mode (Comparation of effectiveness of different taping techniques, Decreasing of number of GSR particles on shooters hands with time) and in LV and ESEM mode (Influence of hand creme and blood on GSR particle detection, GSR analysis directly on textile, Detection of entrance/ exit hole of a bullet on garment, Automated GSR analysis on nonconductive adhesive tape from an old Firearms Residue Kit –DEMO of Metropolitan Police Forensic Science Laboratory).

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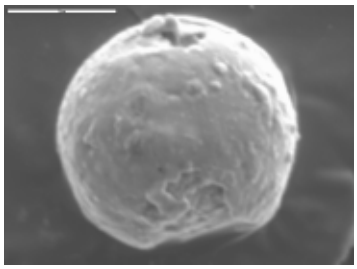
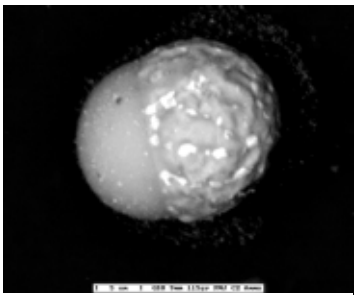


Lead, Barium and Antimony
IAMA Collection

How do you weight morphology in the interpretation of your P-GSR results?



P-GSR particle
Complements of Jozef Lebiedzik, Advanced Research Instruments Corp.

Things to consider…

The Aerospace Report (ASR) seems to be the starting place for our understanding of P-GSR. The report defined GSR by its elemental composition and morphology using secondary electron imaging. Without the ability to search samples with a back scattered detector (BSE) any strategy that would speed up the analyses may have been selected – including one that saw the world of spherical particles as the most likely to be GSR particles.

If we review the ASR we find that they did see irregular shaped P-GSR particles. On page 17 of the Aerospace Report it states that " In the majority of cases, 70 to 100 percent of the particles in a sample of gunshot residue are spheroidal". And again on page 18, "Most of the remaining gunshot residue particles (rarely more than 30%, depending on the ammunition) are irregular". From these statements several things should be remembered:

1. The Aerospace group conducted their examination in 1978 – 1980 using an SEM without a backscattered detector
2. Their overall GSR sample size was rather small (N = ~100 cases)
3. A key word in the above statement is "… In the **majority** of cases..."
4. Nowhere is it stated in the ASR that irregular particles are excluded from being P-GSR particles.

Science can purify religion from error and superstition. Religion can purify science from idolatry and false absolutes.

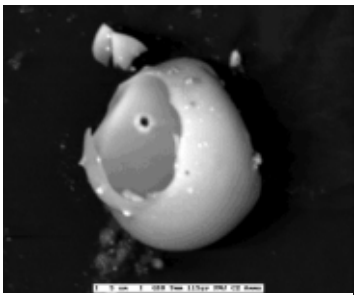
John Paul II, Pope (Karol Wojtyla)

From the ASR many analysts today have come to consider the spherical particle to be the most desirable or comfortable particle to call a P-GSR particle. P-GSR samples today are routinely analyzed using BSE detectors and automated GSR search software. Most laboratories today have analyzed more samples than were analyzed in the ASR and the examinations go beyond just looking for spherical particles. Additionally, the elemental classifications of acceptable P-GSR goes beyond those classes delineated in the ASR.

We as GSR analysts may all agree that when we find an irregularly shaped three component particle that *it is* a P-GSR, but when it comes to an irregularly shaped consistent P-GSR there is much variation in our thinking. Logically, how can we ignore this group of particles? Are we directed by our understanding of P-GSR production, our interpretation of the ASR or maybe by our courtroom experience?

In our laboratory, we report what we see on a submitted GSR sample including consistent P-GSR of both spherical and irregular morphologies. In our report we include statements about the possible origins of those consistent particles. Our interpretation of our findings in the area of consistent particles starts with our understanding of the ASR and continues with our examination of numerous samples using the latest technology.

It is our suggestion that the I.A.M.A. declare 2002 the "Year of the Consistent Particle". Organize a project to take a new look at the consistent particle from its morphology to its prevalence. From a year of data collection we might be able to answer any outstanding questions the we have about the consistent particle and provide data based on the current tools that we have available (BSE and automated particle search software). An expanded understanding of the consistent P-GSR will surely deepen our understanding of P-GSR in general and a collaborative effort will allow us to get to know each other.



P-GSR particle
Complements of Jozef Lebiedzik, Advanced Research Instruments Corp.

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New IAMA Committee Members

As many of you know, IAMA sent out its first newsletter in October of 1999. We have experienced great success in distribution and having increased our membership significantly. Our prime goal has been met. We have been able to generate a successful newsletter providing valuable information to our community and at no expense.

We would like to give special consideration to Jay Walker, Jr. for his invaluable continued support for IAMA.

For the last two years, we have had several individuals serve as Committee Members and would like express our great appreciation for their contributions.
They included:

Timothy C. Fallon
Gary M. Lawrence
Jennifer Kimmett
Lee Fadness
Jay Walker, Jr.
Richard McLaughlin
Samarendra Basu

In order to increase participation, the co-founders of IAMA would like to announce a new organizational structure consisting of four Editors and an Executive Committee. We have felt that the primary criteria for a committee should be involvement, contributions, and hands-on application of SEM/EDX analysis. To this end we are announcing the following Executive Committee and Editors.

IAMA Executive Committee:

Lee Fadness
U.S. Army Criminal Investigation Laboratory

John Giaccalone
West Virginia State Police Forensic Laboratory

Dennis Ward
Federal Bureau of Investigation Laboratory

Ludwig Niewöhner
Bundeskrimiiinalamt (BKA)

Steve Dowell
Los Angeles County Department of Coroner

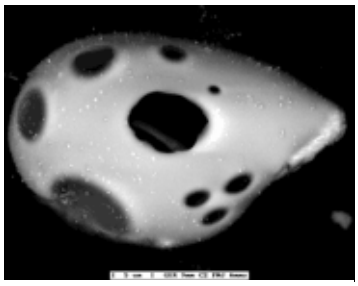
IAMA Editors:

Mike Martinez
Co-founder
Managing Editor

James D. Garcia
Co-Founder
Editor

Tim C. Fallon
Contributing Editor

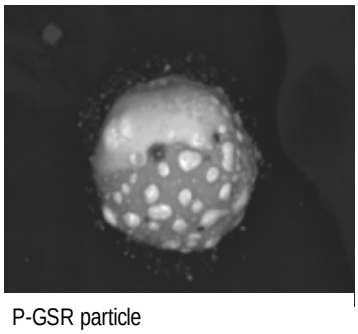
Jay Walker
Associate Editor
Publisher



P-GSR particle
Complements of Jozef Lebiedzik, Advanced Research Instruments Corp.

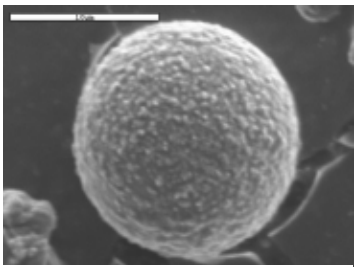
It will never be possible to eliminate all chance of error or misjudgement, but the Forensic Science Service strives to do the greatest good for the greatest number, for the greatest part of time.

"The Modern Sherlock Holmes- An Introduction to Forensic Science Today"
Judy Williams



P-GSR particle
Complements of Jozef Lebiedzik, Advanced Research Instruments Corp.

New SEM Stub Designs



Lead and Barium
IAMA Collection

IAMA is proud to introduce two new SEM stub designs developed by Jon Kokanovich and Robert Bates of the Mesa Police Crime Laboratory, and Jay Walker of Tri-Tech, Inc. for use in gunshot residue collection kits. Both new P-GSR stubs are designed to help ensure compliance with ASTM Guidelines and to assure proper collection procedures are used by the collecting officer.

The "D" Stub

A standard 12.7 mm ultra-pure aluminum stub has a shaved off section which is laser etched with a control number unique to that stub. The shaved face is then color coded and placed into a corresponding color-coded vial label. This further assures that the collecting office has returned the stub to the proper vial, i.e. "Red" Right palm stub is returned to the "Red" labeled Right Palm vial. (See figure 1)

The "Q" Stub

A standard 12.7mm ultra-pure aluminum stub is laser cut with an orientation mark on the side of the stub, then etched with a unique control number on the bottom of the stub. The stub is color coded with the same corresponding color-coded vial label. (See figure 2)

The newly designed stubs are exclusively distributed by:

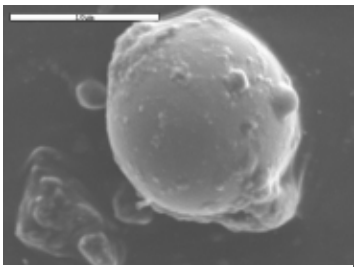
Tri-Tech, Inc.
4019 Executive Park Blvd., SE
Southport, NC 28461
(800) 438-7884 phone
(910) 457-0094 fax
http://www.tritechusa.com
E-mail: tritech@tritechusa.com

The essence of knowledge is, having it, to apply it.

Confucius, 551-479 BC

Figure 1: "D" Stub and Vial

Figure 2: "Q" Stub and Vial



Lead, and Barium
IAMA Collection

Letter to the Editor

Letter to the Editor….

I recently had the challenge of trying to answer a question from one of our colleagues. He was trying to determine whether it would be possible to associate a GSR particle population with particular brands of ammunition (or at least "narrow the field"). I couldn't help much because we haven't constructed a reference listing the elemental compositions of ammunitions. I therefore thought it might be useful if we - those of us reading this newsletter - constructed such a reference collectively. It could include country, manufacturer, brand, caliber, elements present, and method used to determine those elements present (SEM, XRF, manufacturers specs).

Would such a reference be useful? If so, what additional information should be included? A challenge like this might inspire Mike Martinez to construct an IAMA web page, as he indicated on page 6 of issue #3?

Please let Mike know how you feel about such a resource.

Thanks,

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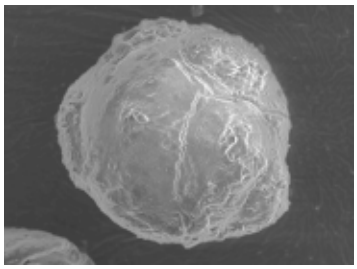


Lead, Barium and Antimony
IAMA Collection

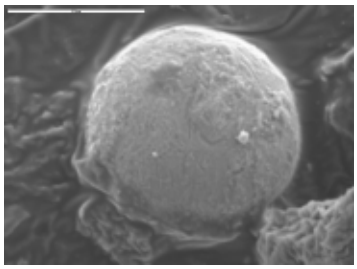
FYI!

A reminder of upcoming events:

Southwestern Association of Forensic Scientist (SWAFS) will be held at the historic Sheraton Gunter Hotel in **San Antonio, TX** on **November 5-8, 2001.** You can find more information about **SWAFS** by visiting http://www.swafs.org. For additional information or reservation information please contact Gustavo De Leon at the Bexar County Criminal Investigation Laboratory at (210) 335-4148.

Give me a place to stand, and I will move the Earth.

Archimedes, 235 BC



Lead, Barium and Antimony
IAMA Collection

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A NEWSLETTER FOR FORENSIC EXPERTS IN P-GSR ANALYSIS BY SEM/EDX

TO: