An EVO Scope for Electrolysis Projectile Measurement

by
Ken Shoulders 11/4/09

Abstract

Whenever an aqueous electrolytic process is run, whether it is for simple electroplating or cold fusion research, there can be an emission of projectiles with mysterious properties that are often referred to in the cold fusion literature as nuclear particles, and more specifically, neutrons. The author has found these projectiles to be clusters of electrons or EVOs and not nuclear in the usual sense of the word although these large electron clusters can be associated with lesser clusters of electrons called muons or mu-mesons and tauons or tau-minus particles. A very simple instrument is proposed here that can help clarify the nature of these emitted projectiles. Since the characteristics of the projectiles are of main concern to workers in the cold fusion field, and the author does not consider himself a member of that group, the further development and application of the proposed instrument is left to cold fusion workers. Several associated experiments that the author has done in the past are outlined in this writing showing the high likelihood of the proposed instrument being able to shed new light on the mysteries of aqueous electrolytic particle projection.

Overview:

The apparatus being discussed here is very straightforward to build and operate in that it has only 5 simple parts to assemble. A drawing of the apparatus is shown in Fig. 1 on page 2. In use, it is dipped into an operating electrolytic bath and measurements made on the charge sign, velocity and shape of particles that come through the entry dielectric cover of the evacuated plastic cone.

Some of the measurements on projected particles or projectiles that can be made are:

- Charge sign (if any)
- Total charge carried for each separate entity recorded
- Velocity of each charged entity
- Charge-to-mass ratio of entity
- Characteristic shape and size of entity or projectile
- Effect of both magnetic and electric fields on entity or projectile
- Video recording of visible strikes made on the aluminum target

The 5 parts of the apparatus are:

- Entry dielectric cover used to isolate the instrument interior analysis region from the electrolytic bath
- A conductive coating over the entry cover to establish a reference for applied analysis fields
- An insulated vacuum cone or chamber to provide a vacuum or low gas pressure flight path for analysis
- A thin aluminum foil used to both set up the acceleration field for the charged particles and a recording target
- A viewing glass plate to maintain vacuum and act as a window for light flashes produced on the target

To help in ascertaining the time of flight of the particles included in the chamber, an ac coupled scope probe can be coupled to the aluminum foil collector electrode. To operate the main features of the instrument, a simple, reversible polarity dc power supply is needed that is variable in potential from essentially zero volts to several kilovolts, which is used for both velocity analysis and helping to raise the particle velocity and energy level of the output strikes on the aluminum electrode for better shape analysis. This power supply is applied to the pair of electrodes available and does not interfere with the electrolytic process due to being insulated from it.

Construction Details:

Even though the device being discussed here is very simple, some tips on its construction gleaned over time in my laboratory on similar apparatus might come in handy.

Vacuum: The vacuum need only be in the range of 10^{-3} torr to accomplish all measurements. This is not a very sensitive system to contamination and these levels of vacuum can be reached by rough pumps alone even without the use of trapping. If a pump is particularly poor, it can often be rendered useful by putting a dry ice trap in the inlet line to the apparatus. Connection to the apparatus can be made by gluing an appendage onto either the side of the vacuum cone or the glass viewing plate.

Vacuum Cone Construction: The insulated vacuum cone can be made from almost any material that is compatible with the electrolytic process. Lucite is a good choice because it is easy to fabricate although glass, Teflon or polycarbonate plastic will work. One often needed addition to a simple insulated enclosure is a charge dispersing coating on the inside surface. This is particularly true when operating in pure vacuum instead of using a low pressure gas background capable of dispersing charge. The advantage of using Lucite is the ability to simply rub its surface vigorously with acetylene black or any other finely divided carbon form like simple soot. This process does not work well on Teflon and is virtually impossible on glass. In the case of glass, it is possible to paint on a plastic like epoxy that has a small amount of acetylene black added to it. The resistance of the coating should be in the order of 100 megohms from one end to the other.

Glass Viewing Plate: The viewing plate can be cut from a microscope slide with almost no difficulty at all. Sealing the plate and the aluminum foil can be done by the application of a silicone rubber such as General Electric RTV 630. With mild heating using a hand-held heater or hair dryer, the seal sets in about 2 minutes time. These seals are sometimes reusable although they are so simple to assemble there is no use to save them. When electrical conductivity is needed for contact to either end of the inside resistive coating, a small amount of acetylene black can be added to the rubber.

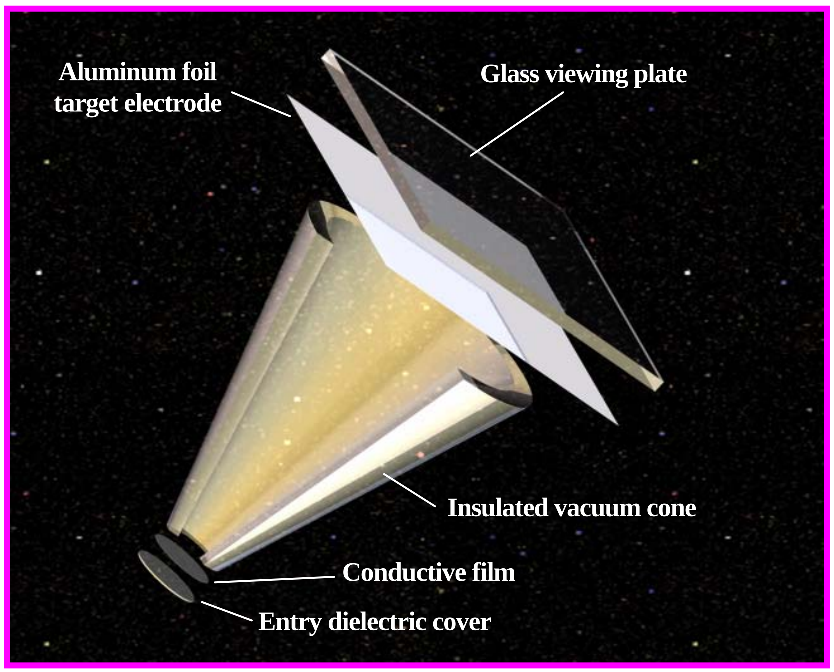

Fig. 1

Cutaway and disassembled view of the EVO Scope to be used for assessing the properties of projectiles from aqueous electrolytic processes sometimes used in cold fusion work.

Aluminum Foil Electrode: This foil is optimally 1/4 mil thick although ordinary foil wrap sold as kitchen foil and 1 mil thick is satisfactory if very smooth on the surface facing the entry dielectric cover.

Entry Dielectric Cover: This can be an aluminum film coated Mylar of almost any thickness.

There is one caution to be offered here. Often when a good conductor is placed near a dielectric, the EVO will run on the dielectric as a guide instead of penetrating it.

Conductive Film: The solution often found to allow dielectric penetration is to use a poor conductor on the inside of the entry dielectric cover. In this case, a very thin resistive coating of a plastic like an epoxy admixed with a small quantity of acetylene black is sufficient to solve the problem and permit penetration of the entry dielectric cover. It is clear that this thin conductive film should be connected to the equally thin resistive coating on the inside of the vacuum cone in order to provide continuity. This conglomeration of material constitutes a good seal for the vacuum level needed here. In fact, it cannot be removed without destroying the film parts.

Falling Into the Nuclear Trap

Many people are subject to a strong herd instinct and find it difficult to depart from conventional behavior and practice. This is largely what seems to be happening in cold fusion practice where most believe in a nuclear basis for the excess heat production claimed. The author is no exception to this herd effect and an example will be shown below that occurred circa 1980. To show details of this trapping, a scanned copy of page 2-17 was taken from Ref. [1] and is entered below. Fortunately, the bad assumptions of nuclear effects were quickly corrected and the work continued at high efficiency using EVO explanations of what was seen.

Mother EVs

Although I was still heavily into the question of how long the EV filaments were, I had a short interlude where I tried to answer some questions about why some of these EV shots broke my apparatus. There was a class of shot, usually running at 20 kv or so, that had been responsible for ruining a digital voltmeter that was located 3 feet away from the vacuum system, and, at another time, had blown out a power supply and pulse generator that wasn't even hooked up to the experiment. I knew I was getting strong electromagnetic impulses but this was a bit more than I was used to.

Instead of starting down in the radio frequency spectrum to look for the trouble, for some reason I went to the X-ray spectrum. I made up a little X-ray film packholder about 1/4 by 3/8 inches that could be put in the path of an EV so as to catch the EV on the front and, in the back, expose the film that had been separated by various filters. The film was Kodak NMB-1, a single-sided X-ray film.

The witness plate, or first plate in the pack, was 0.001 titanium so that I could verify the presence of an EV in a standard way. The second plate was an optical radiation filter of aluminum to stop any thermal spectrum coming from the back of the titanium. The X-ray film was the next layer. The film pack was exposed with an EV and then developed and checked for radiation indications. There was one black spot right where the EV had hit the titanium. So, there are X-rays.

I ran the same scheme again except that this time I upped the ante on the filtering to a 0.003 molybdenum EV target and a 0.003 lead filter placed before the film. Same result. One black spot where the EV had struck. So, there really are X-rays around here.

One more try, this time for serious stuff. I set up the scintillation detector and energy-dispersive analyzer and calibrated it with americium 241 at 59 kv and cesium 137 at 662 kv. A 3/4 inch-thick piece of brass cut the cesium 137 count from 804 to 459. The scintillator was then placed outside the 1/4 inch bell jar at a spacing of 4 inches from the EV source. When the EV source was fired up at about 20 kv and was running in the "sharp" mode where one could almost feel something happening, and indeed there was a different acoustical ring to the shots, the scope showed huge peaks from the scintillator output even with the 3/4 inch brass plate interposed between the source and the detector. There was some electromagnetic pickup leaking into the detector, but when this was shielded out the signal from the EV gamma output was still there.

By going through all of the standard procedures, I was fooled into thinking I had high energy gammas coming from the experiment when all I had were EVs, as they were called then. It took several months before I caught on. The turning point in this recognition process occurred when I was changing the angle of a highly asymmetrical scintillator crystal and noticed its signal output was proportional to the length of the crystal presented to the EVO source. This indicated the energy source completely penetrated even the maximum dimension of the cesium iodide crystal. That was not supposed to happen.

While most are content to remain in their state of bliss and give up looking for an alternative explanation of odd scientific behavior, some look for answers outside of this comfortable norm. Although the author is not well read in the cold fusion field, he is certainly aware of the vast amount of conformity to the nuclear explanation about what is going on. A few participants in the field are beginning to find their way into alternate explanations. Among these are Prof. R. A. Oriani and Prof. Ludwik Kowalski. Some excerpts from their work are cited below:

Oriani, R. A. Reproducible Evidence For The Generation Of A Nuclear Reaction During Electrolysis. In ICCF 14

International Conference on Condensed Matter Nuclear Science. 2008. Washington, DC.

Reproducible Evidence for the Generation of a Nuclear Reaction During Electrolysis

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ABSTRACT

Past work in this laboratory has shown that nuclear particles generated during electrolysis can be registered by CR39 plastic detectors held within the electrolyte solution, suspended in the vapor above the solution, or placed just below the metal cathode that serves as the bottom of the electrolyte compartment of the electrolysis cell. However, not every electrolysis experiment produced nuclear particles so that total reproducibility was not achieved. Therefore another experimental technique has been developed which has shown the generation of nuclear particles in each of twenty five consecutive electrolysis experiments using heavy or light water solutions of lithium salts. The damage trails caused by the nuclear particles are made visible by etching in hot concentrated caustic solution, and the electrolysis experiments are accompanied by suitable blank, or control, experiments. The damage trails begin either at the surface of the CR39 chip that faces toward the electrolyte, at the opposite surface, or totally within the 0.83 mm thickness of the plastic detectors. It is demonstrated that the nuclear damage trails could not have been caused by ordinary radionuclides contaminating anything involved in the experimental procedure. The described phenomena pose a formidable challenge to nuclear theory.

In addition to the above paper given at ICCF-14, a recent set of measurements revealed a wider extent of projectile capture in the vapor above the experiment. The email note entered below by Prof. Richard Oriani briefly discusses this measurement.

(The attachments show) "photomicrograph of nuclear tracks produced by holding a CR39 chip in the vapor above the electrolyte that surrounds the anode of an operating electrolysis cell (the anolyte). By using a U-shaped cell it is possible to expose the chip only to oxygen and water vapor, no hydrogen. The first attachment is such an image the original microscopic magnification of which was 100X. The second attachment shows tracks produced by exposure of a CR39 chip to the radiation from 241Am.

Richard"

In the attached micrographs, there were indeed classical etch tracks in the CR39 chip. The 241Am tracks were very straight while the electrolytically produced projectile track was somewhat wavy, apparently due to EVO sensitivity to charge variations in the dielectric it was traversing.

On a similar note, the following announcement of a forthcoming paper intends to follow the lead of Prof. Oriani and essentially repeat some of his experiments.

From ICCF-15 Abstracts:

On electrolysis-induced emission of charged nuclear projectiles

On electrolysis-induced emission of charged nuclear projectiles
Ludwik Kowalski, William Beaty, Jeff Driscoll, Mike Horton and Pete Lohstreter

On electrolysis-induced emission of charged nuclear projectiles
Ludwik Kowalski, William Beaty, Jeff Driscoll, Mike Horton and Pete Lohstreter According to Richard Oriani, production of nuclear projectiles due to electrolysis, using his protocol (1), is highly reproducible. The Curie Project was organized to verify this claim. The electrolyte is a solution of Li2SO4 in light water. The cathode is nickel and the anode is platinum. Nuclear projectiles are detected with CR-39 chips (2,3,4,5) protected from the electrolyte by a thin Mylar film. The work is in progress. Preliminary results confirm emission of nuclear projectiles, similar to alpha particles. But the effect does not seem to be reproducible.

References:

1) R.A. Oriani "Reproducible Evidence for the Generation of a Nuclear Reaction During Electrolysis," Proceeding of the 14th Int. Conf. on Cold Fusion, October 2008, Washington D.C. The report can be downloaded from http://csam.montclair.edu/~kowalski/cf/368TGP_oriani.pdf
2) C. Brun et al., Radiat. Meas. 31, 89 (1999)
3) F.H. Seguin et al., Rev. Sci. Instrum. 74, 975 (2003)
4) D. Nikezic, K.N. Yu, Mat. Sci. Eng. R. 46, 51 (2004)
5) F.M.F. Ng et al., Nucl. Instrum. Meth. Phys. Res. B 263, 266 (2007)

These new thrusts in determining the origin and nature of electrolytically produced projectiles could be greatly benefited by the use of the EVO scope presented here.

Where do the Projectiles Come From?

Electron charge clusters or EVOs can come from just about anywhere as they seem to be a most ubiquitous particle species. They are made by almost anything that can produce a microscopic spark. This includes bubble formation, sonic cavitation, fracto-emission of brittle dielectrics and metals and plain electric sparks made by an assortment of methods including rubbing your feet on a rug and touching the doorknob. All of these processes produce an EVO that follows distinct operational laws, although they are often complex and confusing.

In this note, we will focus on the bubble mechanism for production of projectiles or EVOs. To emphasize this source for the cold fusion workers, a specific case will be used that is directly associated with the cold fusion work of Prof. George Miley of the University of Illinois. One page of text and photos taken from Ref. [2] and reproduced here on page 5 and page 6 show SEM photos taken by the author showing the effects of bubbles producing EVOs on a micro scale. In addition to the EVO boreholes shown, many undoubtedly escaped as projectiles to be measured outside of the electrolytic bath.

Energy Production Using EVOs [From Ref. [2]

One of the better-known fields of endeavor for the production of anomalous energy is called ***Cold Fusion***. This field is divided into segments having apparently distinct properties; but in fact, rely on only one basic process allied with EVO usage. The nominal divisions of cold fusion are: electrolytic, sonically produced bubble collapse, gas discharge and thermal cycling. Tests for EVO involvement in each of these divisions were run by Shoulders [8] and found to contain conclusive evidence of EVO action. The EVO production process used in each division was different but the end result was the same, namely, the EVO converted material to a fluid and transported it at high velocity into the lattice of the experiment where the momentum energy was recovered as heat.

The following SEM images were selected from reference 8 generated by Shoulders. This 350 MB CD shows many examples of EV involvement in various cold fusion processes

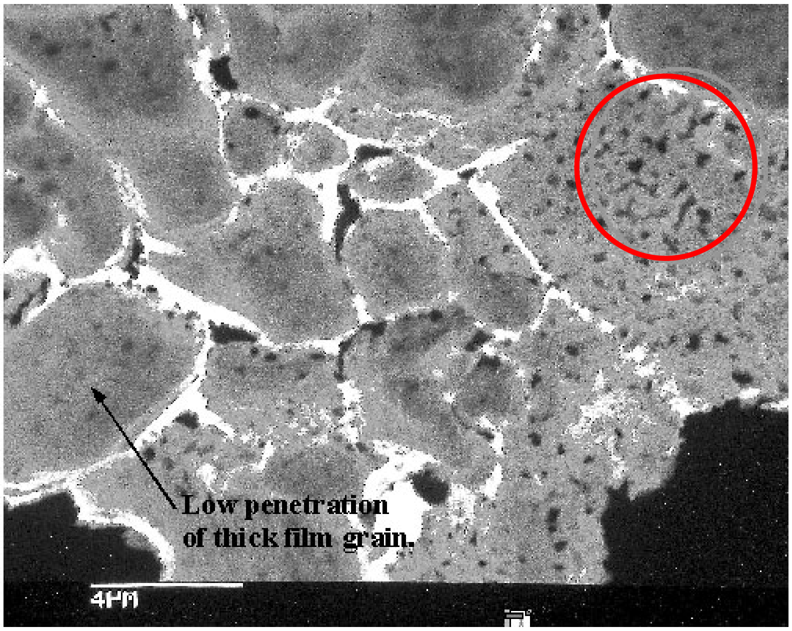

Fig. 1

SEM of the underside of an electrolyzed palladium-nickel film produced by George Miley and associates at the University of Illinois.

Boreholes near circle are shown passing through the film particles and then turning and running laterally along the surface of a supporting alumina substrate in typical EV fashion.

The approximate size of the boreholes shown is 0.2 micrometers in diameter

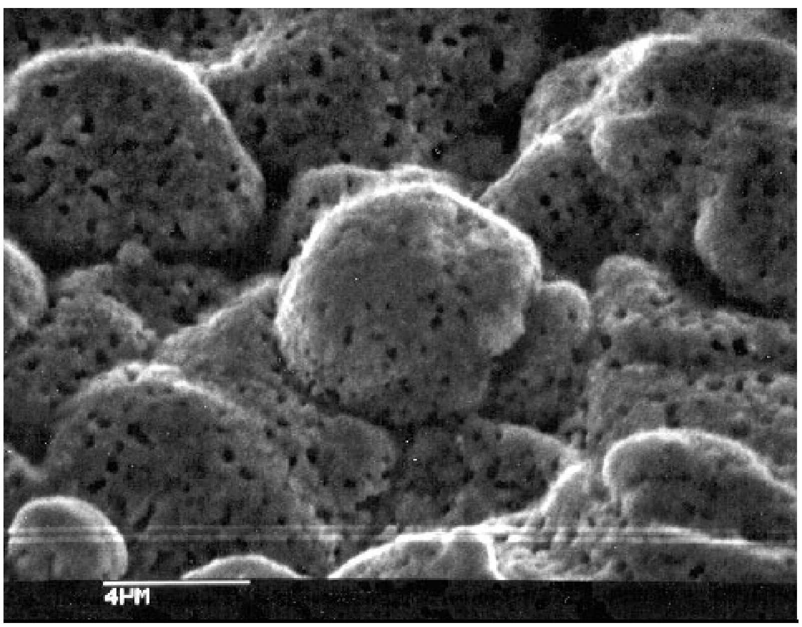

Fig. 2

SEM photo of the topside of an electrolyzed palladium-nickel film produced by George Miley and associates at the University of Illinois for cold fusion measurements.

Boreholes can be clearly seen as can a fuzzy surface covering that is probably a polymer growth developed from plastic bag storage over the one-year time before SEM analysis.

The microscopic boreholes seen here are very characteristic of EVOs encountering a metal. In many other publications by the author, SEM analysis shows how the material is ejected from the borehole as atomized material moving at high velocity. These high velocity particles are converted to heat upon encountering the lattice of the host material. This is the base cause for excess energy production in such systems. The author has found that the pure metallic lattice is the least effective class of material to use in energy production from a solid as there are about 6 separate phases of operation needed for good energy yield. Pure metallic systems provide for the use of only about two of these, hence, low production efficiency.

For the purposes of this paper, the boreholes shown above can be strongly associated with electrolytic induced bubbling that then gives rise to the source of the projectiles being sought.

Will Projectiles Enter the EVO Scope Chamber?

Many cold fusion literature references show how projectiles easily traverse nearly a millimeter of plastic CR-39. This is a clear indication that they will penetrate the thin entry dielectric cover of the EVO Scope from the standpoint of thickness or mass density. Another point of concern that has already been mentioned is that care must be taken to assure penetration of the plastic and not have it used as an EVO guide by the projectile. This can be assured by striking the dielectric at a near normal angle and using a resistive backing on the entry dielectric cover.

On the subject of EVOs or projectiles traveling in dielectric materials, Ref. [3] is partially reproduced below showing how photographic film and vacuum flight medium display an EVO traversing the medium. The use of photographic film is far superior in resolution and sensitivity to CR-39 and the depiction of details of a flight path can be seen. This detailed motion includes the helical motion of the EVO.

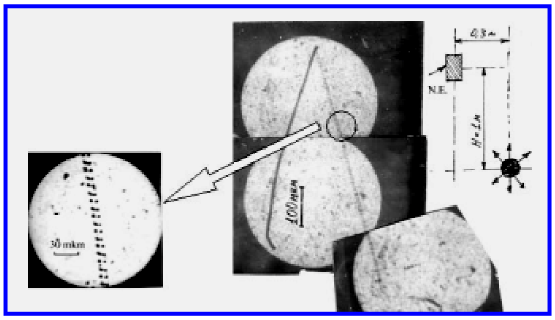

Fig. 2. Micrographs showing EVO helices running in photographic gelatin.

"Observation of transformation of chemical elements during electric discharge"
by
L.I. URUTSKOEV, V.I. LIKSONOV, V.G. TSINOEV
Annales Fondation Louis de Broglie, Volume 27, no 4, 2002 701

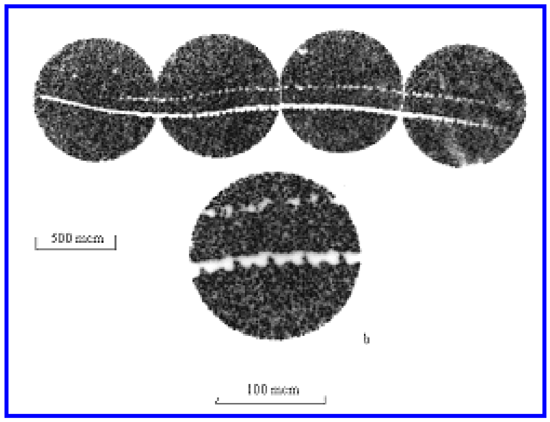

Fig. 3. More micrographs of EVO helices by the same authors shown in Fig. 2.

Fig. 4. (Right) EVOs shown describing a helical, vacuum path.

The photo of electron emission was taken with a special pinhole camera. A splitting is immanent due to lack of confinement of any kind. This work was done by Ken Shoulders and reported in a paper placed on the web.

What Does the Target Electrode See?

Low velocity EVOs can more easily penetrate a target than a high velocity one because the state of excitement is lower. This lower excitation lowers the expressed charge of the entity allowing less interaction with material. With sufficiently low interaction, there is no recording of passage on the target electrode. However, at a sufficiently high velocity, in the several hundred volt range, there is severe interaction with conductors and even higher interaction with semiconductor materials like SiC. This interaction with material allows for the use of conductors as recording medium. Thin aluminum foil is a convenient medium to use as it leaves a permanent impact mark that does not need developing. Photos taken from Ref. [4] and shown on page 8 are examples of encounters between EVOs made by simple sparking on a 6 micrometer thick aluminum foil.

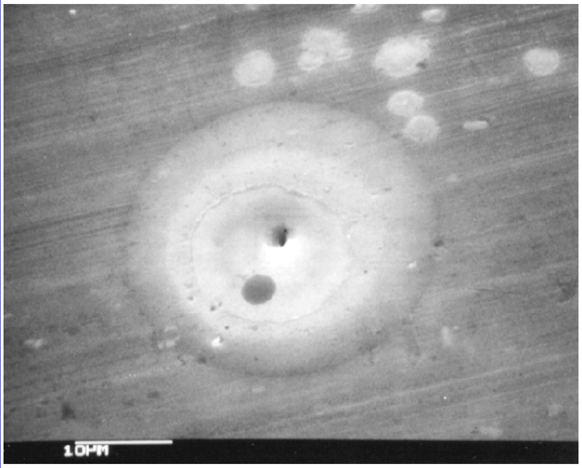

Fig. 1 EV strike on 6 micrometer thick aluminum foil. Entry side.

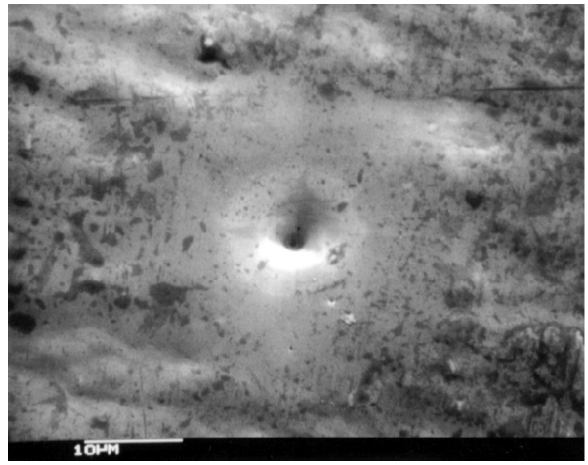

Fig. 2 EV strike on 6 micrometer thick aluminum foil. Exit side.

With thicker foils of 0.001 inch thickness and a semiconductor impedance matching coating on the foil, much more violent interaction occurs. The SEM photos below, also taken from Ref. [4] testify to this increased interaction.

Fig. 12 Entry side of an EV strike on silicon carbide grain coated on a 0.001" thick aluminum foil.

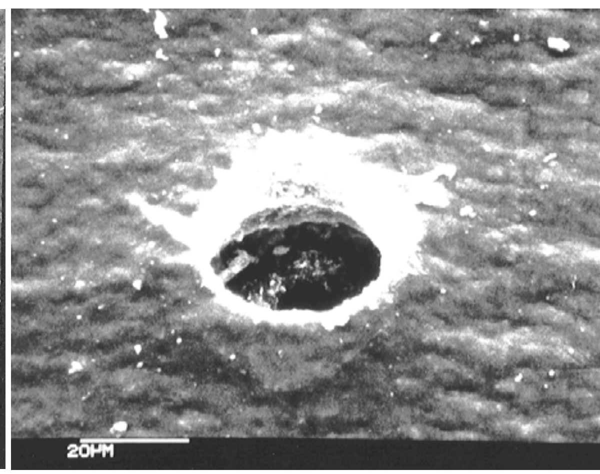

Fig. 13 Exit side of an EV strike on silicon carbide grain coated on a 0.001" thick aluminum foil.

With such penetrating power, aluminum foil detectors serve as good witness plates for the projectiles arriving and being measured. The small holes opened in the foil give out adequate light for real-time video recording of the events occurring, as seen through the glass viewing plate, and they are also good subjects for later microscopic examination.

In addition to the physical recording of events, the aluminum electrodes serve to capture and record entity charge on an oscilloscope. For a single strike of a 10 micrometer EVO, the output signal into a 50 ohm load is 50 volts. For the smaller EVOs found on the Miley samples, having a diameter of 0.2 micrometers, the signal is proportionately lower according to the volume of the entity. It is very likely that the arrival of most projectiles can be recorded on an oscilloscope without difficulty.

Can the EVOs Fly Predictably Through the Vacuum Space?

Once the projectiles pass through the entry window, they must pass predictably through the vacuum space and not run on the dielectric wall toward the aluminum electrode. Although this cannot be assured, there was a similar apparatus described in Ref. [1] that was copied and inserted below.

Gas Guns

In an entirely different approach to injecting EVs into a vacuum region for measurement, I built a gas triode similar to the one shown in Figure 3:12.

The entire apparatus was operated in a vacuum chamber pumped by an oil diffusion pump. The EV source was operated at a sufficiently low hydrogen gas pressure, perhaps 10^{-2} torr, that there was no gas discharge when several kilovolts were applied to the cathode. At a slightly higher voltage the cathode would fire off an EV and, with a positive voltage applied to anode #2, operating in near-vacuum due to the aperture plate and differential pumping, the EV would strike the center of that anode.

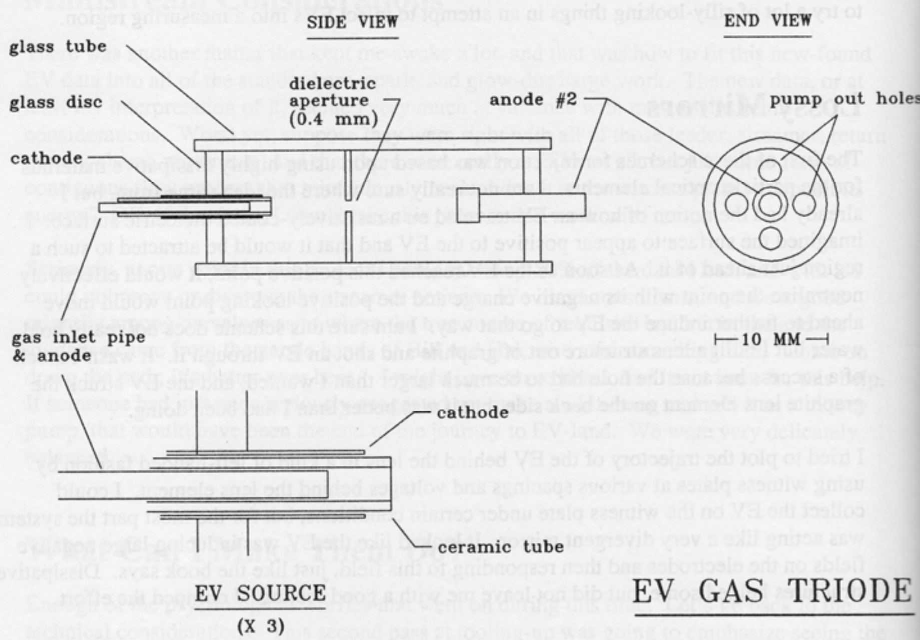

Figure 3:12

Tooling Up Again 3-14

Figure 3:13 shows an SEM photo of the removable witness plate that served as an anode and Figure 3:14 is a magnified view of the center region.

These look like standard strike marks that can be obtained by almost any method. Considering that the anode was over 1 inch away from the source, and that the entire shot group, usually fired one at a time, was only about 200 micrometers in diameter, I was surprised by the consistency of such a random-looking process. The pressure adjustment was very critical, and this was not the kind of beast I wanted to incorporate into a complex system of measurements. Why did I do it? I don't know. Maybe I just wanted to get one of these things through a hole under any conditions. As they say, "Onward, Through The Fog."

Figure 3:13

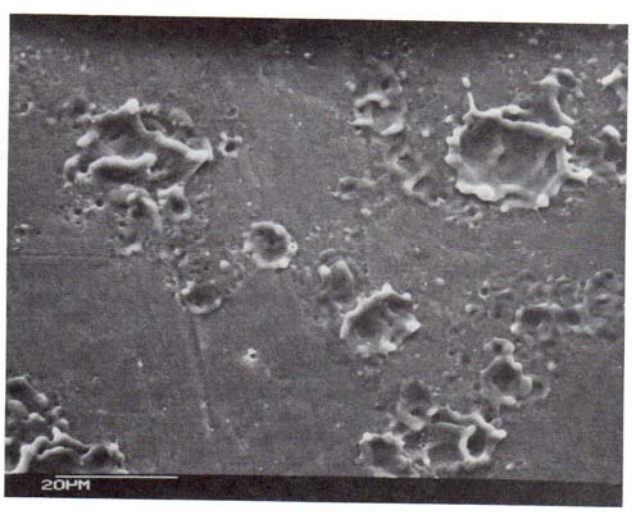

Figure 3:14

From the foregoing experience, it seems there is a high likelihood of achieving our expected goal of conveying projectiles through the analysis space without undue difficulty introduced by the dielectric wall of the container.

More on Proposed Measurements Using the EVO Scope

Since the EVO Scope is only about 1 inch long and has 2 small, flexible wires attached to it, immersing it into an electrolysis experiment is easily done by holding or mounting it by the vacuum line attached to either the top or side of the unit. Once immersed in the experiment, there is not much to do except to attach the two wires connected to the Scope electrodes to the power supply and one other shielded pair to an oscilloscope. If a video camera is used, it must be aligned with the aluminum electrode and light shielded from the scene. After this initial setup, the scope is ready to detect particles, EVOs or projectiles that are coming from any part of the experiment that the nose of the scope is directed toward. The smallness of the nose does afford a limited degree of selectivity in detection of particle location.

The velocity and charge sign of particles entering the analysis region can be determined by retarding potential methods used in conjunction with a variable voltage, reversible polarity power supply and the current collection capability of the collector electrode. For dc measurements, the collector electrode must be isolated from the resistor used to disperse wall charge because the current of the measurement is very low. It is likely that an ac coupling to a high-gain, wide bandwidth oscilloscope will be best. For such low current measurements, shielding is recommended although such sharp pulses are involved that normal pickup from 60 Hertz mains is not a problem if only high frequency coupling is used.

For particle count, identification of projectile size, shape and spatial distribution by witness plate technique, a high voltage, perhaps in the kilovolt range, would be applied to the collector electrode. Strikes that produce visible flashes can be recorded on the video camera and invisible marks can be seen on the aluminum foil using either optical or SEM methods after disassembly.

All in all, I believe so much can be learned about projectiles in such a short time that the lifespan of the EVO Scope technique could be quite short after it is learned that projectiles are just plain vanilla EVOs. One caveat for this statement is that the EVO Scope could aid in increasing the efficiency of energy production processes in general, since I believe all of them use EVOs as their basis of operation.

A Final Statement

This is such an easy instrument to make and use that anyone working in their kitchen, basement or garage could do it with ease. I sincerely hope someone will give it a try and remove one of the cold fusion enigmas. For me, I will continue on my merry way in another segment of the energy production business using EVOs that does not give a fig about electrolytic processes.

References

[1] K. R. Shoulders, *EV-- A Tale of Discovery,* Austin, TX, 1987. A historical sketch of early EV work having: 246 pages, 153 photos and drawings, 13 references. Available from the author at: 365 Warren Dr., Ukiah, CA 95482 Phone: (707) 467-9935 Email krscfs@svn.net

[2] Energy Conversion From The Exotic Vacuum-Revised by Ken Shoulders and Dr. Jack Sarfatti
http://www.svn.net/krscfs/Energy%20Conversion%20From%20The%20Exotic%20Vacuum%20Revised.pdf

[3] *Lightning as an EVO Based Process by Ken Shoulders.* This writing is available for download from the author's website as a 7 MB Word file with accompanying video clips of high speed lightning shots.
http://www.svn.net/krscfs/Lightning%20Process/

[4] *Charge Clusters in Action* by Ken Shoulders and Steve Shoulders, Bodega, CA
http://www.svn.net/krscfs/Charge%20Clusters%20In%20Action.pdf