

CHARGE CLUSTERS IN ACTION  
by

Ken Shoulders and Steve Shoulders<sup>©1999</sup>

Bodega, CA

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## ABSTRACT

New energy transformations have been found using highly organized, micron-sized clusters of electrons, or EVs, having soliton behavior, with electron populations on the order of Avagadro's number. When interacted with solid material, these charge clusters perform a low-energy phase transformation type of atomic disruption that liquefies the lattice and propels the material to a high velocity without apparent signs of conventional heating. Using an ordinary thermal interpretation, a thermal gradient for bulk material greater than 26,000 degrees C per micrometer would be required to achieve these effects. Evidence will be shown for the EV transiting the solid material, fluidizing it by contributing one extra electron per nucleon for a period considerably longer than the relaxation time, and then imparting momentum to the fluid. Under such conditions, the impact of this fluid on another solid buries a slug of solidified material to a depth of over 20 micrometers. This abnormal behavior introduces the notion of energy gain produced through a low-energy atomic and molecular phase change coupled with high recombination energy release. Evidence will also be introduced for the underlying energy production process stemming from the equivalence of an electron-annihilation energy release based on the manipulation of fractional electronic charge.

Scanning electron micrographs will be introduced showing EV borehole perfection, dual EV existence, and an electrically driven, sloshing type of material reflection in the borehole that is correctable with impedance-matching, micro nozzles. Micro thrusters using a 20 micrometer diameter and 100 micrometer long slug of non-explosive material will be discussed that are based on a spark-like propulsion process giving sufficient velocity to produce shock cones 70 micrometers apart at atmospheric pressure after being initiated from an energy source of 20 micro Joules. In vacuum, the ions from such a source travel 1 cm in 50 nanoseconds. As an example of the new energetics produced by EV interaction with material, data will be submitted on an intense light source having dimensions of a few micrometers and duration of several picoseconds arising from a form of synchrotron radiation. The basis for controlling the wavelength of this photon source from the visible light region to gamma wavelengths will be discussed. Micrographs will be shown of a low energy nuclear reaction that has produced nuclear transmutations by using a nuclear cluster reaction process.

## BACKGROUND

This paper is about several interrelated discoveries that, taken together, will greatly improve our ability to produce and manipulate energy and material. The basis for this manipulation springs from the ability to cluster charge into a dense, tightly bound packet instead of using individual electrons. It is also about what can be easily seen and proven right now with some pointers as to what lies ahead.

The original discovery of this charge compression and containment process was made in 1980. There was a description of the discovery process and electronic devices using such charge clusters published privately in 1987<sup>(1)</sup>. Several patents on electronic systems were subsequently issued in both 1991 and 1992<sup>(2)</sup>. Others have published three papers on the structural aspects of charge clusters<sup>(3,4,5)</sup>. In 1996 a paper was published by the authors on a low-energy technique for causing nuclear transmutations in matter<sup>(6)</sup>. All data produced so far is exploratory in nature and none of it is thought to be the last word.

During the years spent working on the electronic aspects of what I called EVs, a Latin acronym for strong electron, there were many sightings of very intense effects that had no place in an electronic technology. These effects were just swept under the rug, so to speak. Since work in the electronic phase was over, I have been busy digging out energetic effects from under the rug, dusting them off and seeing what they were. The effects have since been quantified to a degree that produces some utility, but there are still many mysteries left uncovered. This paper is largely a discussion of some of the minor or ancillary effects found. The good stuff that has been found will be published later when there can be no arguments about its utility.

## STRIKING EFFECTS

In the lingo of charge cluster technology, a strike is what an EV does when it hits a target. The effects produced can be very dramatic if the conditions are right. One mystery that had to be resolved early on is the difference between a spark and an EV. It was found that there is none. A spark is simply the visible, ionized gas trail left by an EV, although in some sparks the EV is so weak that it is barely detectable in the trash surrounding it. Every spark made has an EV running out in front of it. In addition, the EV has electron feelers running ahead of it to tell it what to do.

To demonstrate the above-mentioned point, an ordinary spark in air, produced by an induction coil, can be used to strike a foil of aluminum. What is seen under magnification is a mark that is characteristic of an EV strike. Fig. 1 shows the front side of a 6-micrometer thick aluminum foil that has been struck by a spark carrying an EV. Fig. 2 is the backside of the same foil. It is clear that a well-organized energy form has penetrated the foil. There is no lateral motion showing and this is a definite indication that the energy form was short and was not a long string of current with a tendency to meander over the surface. Metals are hard for an EV to cope with, as the electron supply from the metal is too great for the EV order to continue. As a result, the range of penetration is only several micrometers in a good conductor.

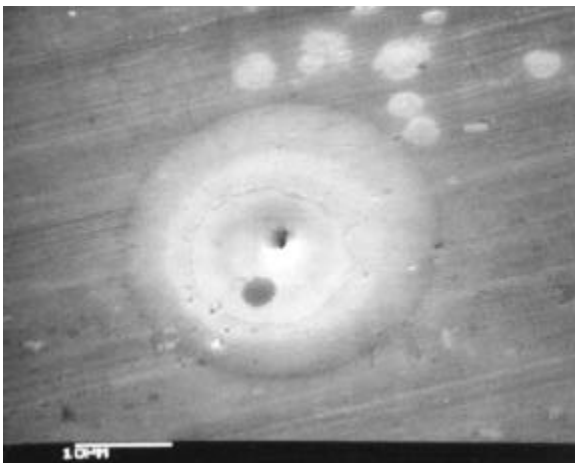


Fig. 1 EV strike on 6 micrometer thick aluminum foil. Entry side.

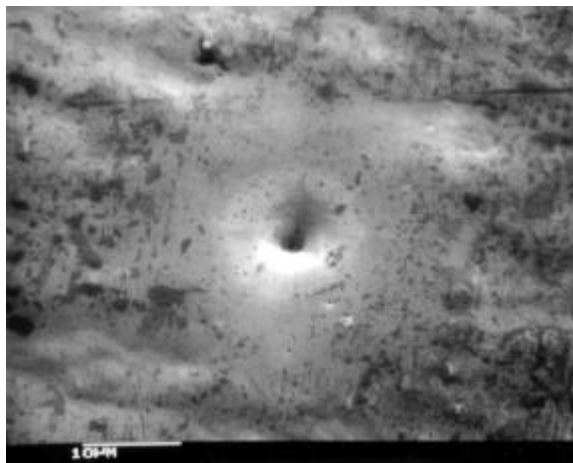


Fig. 2 EV strike on 6 micrometer thick aluminum foil. Exit side.

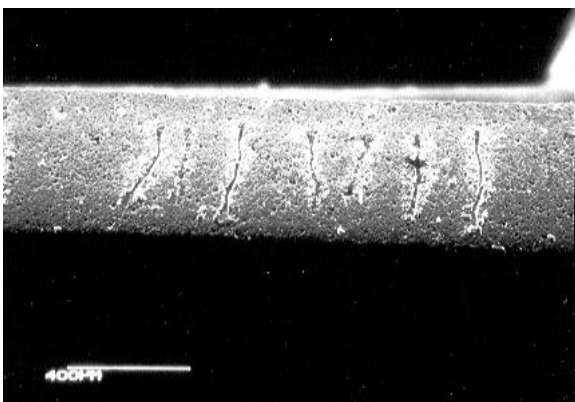


Fig. 3 Cross section of EV boreholes through 1/2 millimeter thick aluminum oxide plate.

Dielectrics and semiconductors is another matter entirely and a penetration range of over a millimeter per kilovolt is common. One convenient configuration for penetrating a dielectric with an EV is to lap the edges of two dielectric plates that are about 1/2 millimeter thick and press the lapped edges together. This gives a nice cross section view when EVs strike the micro-crack produced by joining the edges. The plates are then placed on a grounded foil of aluminum and an induction coil sparked to the crack on the side of the dielectric away from the grounded aluminum. Fig. 3 shows an example of this method applied to aluminum oxide having a melting point of 2,050 degrees centigrade.

As can be seen, there are 7 distinct trails showing in the center of the edge view of the alumina plates. There is a slight taper on the top and bottom of the plate that makes the plates touch in the center and not at either the top or the bottom. Such a tapering technique gives control over the entry and exit angles for the EV. This is important, as it has been found that an EV must be terminated in its characteristic impedance just like any fluid flow or electromagnetic wave.

When the flow encounters a discontinuity, a reflection occurs. In order to have the EV make just one pass through the material it is necessary to taper the output side as a small horn. If this is not done, sloshing will occur for both the EV and the material it propels.

### SLOSHING

Sloshing would seem like a trivial thing to consider if it were not for the fact that it is caused by a sloshing EV and this implies a very high degree of coupling between the EV and surrounding material. Fig. 4 shows the entry side of one of the traces carved by an EV as shown in Fig. 3. This particular channel was not well terminated and the EV rebounded several cycles before exiting the system. By carefully examining the overlap pattern of the material at the top of the channel, it can be seen that waves of material are laid down in a successive and diminishing pattern. More decisive evidence of this effect is shown in Fig. 5 and Fig. 6. Fig. 5 is a color, optical micrograph of an EV strike on lead oxide glass. It can be seen that the material has been laid down in a sequence of 2 strokes. If the photograph is reproduced in black and white, it is not as vivid as in color. Fig. 6 is a SEM photo of the same strike and gives a different view of the effect. As can be seen, the borehole is quite smooth and 2 waves of deposit are apparent and

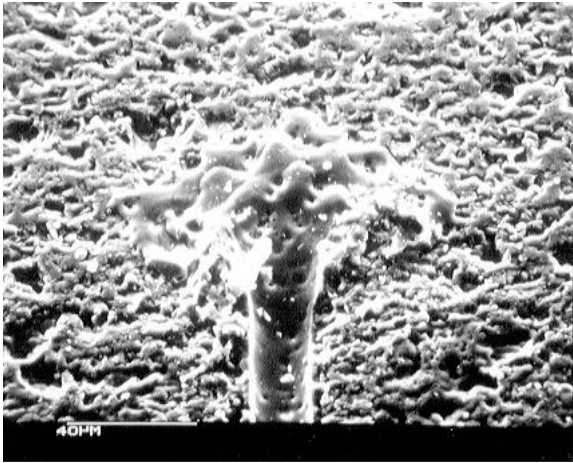


Fig. 4 Entrance cross section of EV borehole in aluminum oxide showing sloshing cycles.

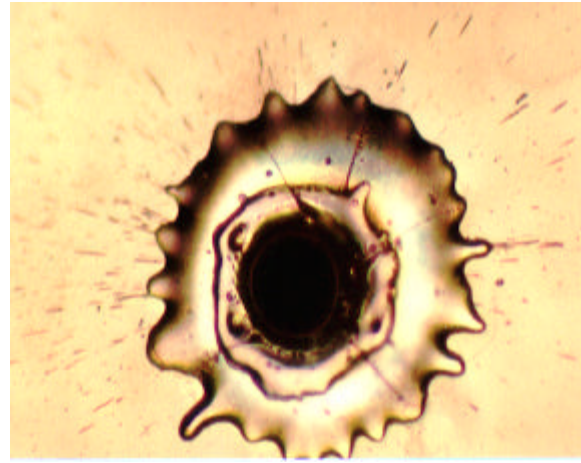


Fig. 5 Optical micrograph of EV entrance into lead glass showing wave action of sloshing.

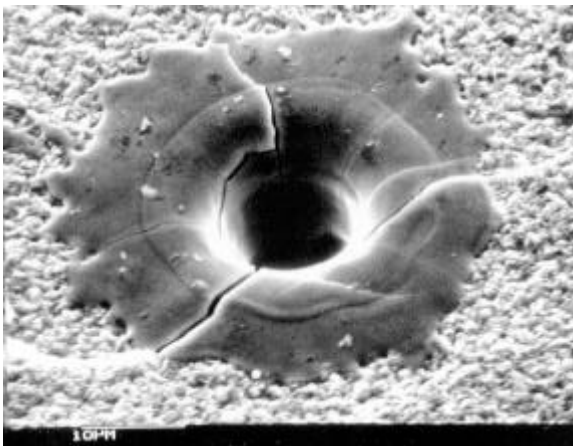


Fig. 6 SEM micrograph of EV entrance into lead glass showing wave action of sloshing.

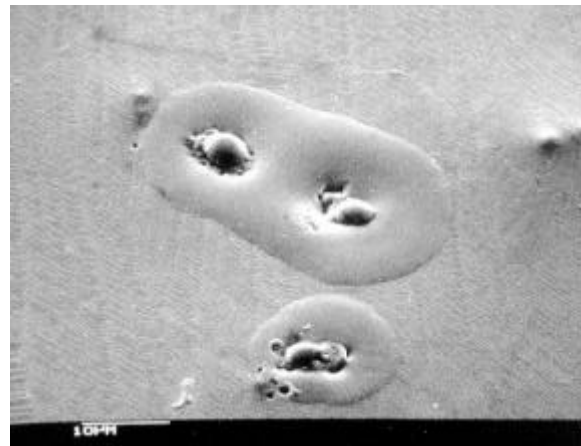


Fig. 7 Dual EV entrance into lead glass showing synchronized arrival of EVs.

proper EV impedance termination is almost accomplished. Fig. 7 shows an example of a strike on lead glass that is even nearer to termination. In addition, this micrograph shows a dual EV strike in which paired EVs travel

side-by-side and enter the material at precisely the same time. The freezing pattern testifies to the time coincidence. A third strike also shows in Fig. 7 but is not related to the dual EV.

The technical importance of this sloshing, being an indication of EV movement, is that as a measurement method, we are able to see EV movements in places not heretofore visible. Some of the motions are essentially frozen in place. As will be shown in a later section, the cause for an extremely intense, microscopic light source can now be seen as an oscillatory EV motion.

### MATERIAL DISRUPTION

A question that comes up with the sloshing argument is concerned with how an EV manages to get around all of the material that is in its way. The answer to the question is, it doesn't. The EV goes through the solid or liquid material.

When measured separately <sup>(1)</sup>, an EV appears to be a collection of electrons that has a number density equal to the number of nucleons in a solid. It thus has an electron population equal to Avagadro's number. Under such conditions, if an EV passed through solid material, there would be one extra electron contributed to the lattice per nucleon. Correspondingly, the electronic bonding of the material would be nullified and a liquid or gaseous phase would result. After passage of the EV, things would take a few moments to sort themselves out and return to the lowest energy state available. This would be classed as an atomic disruption process and not a conventional melting.

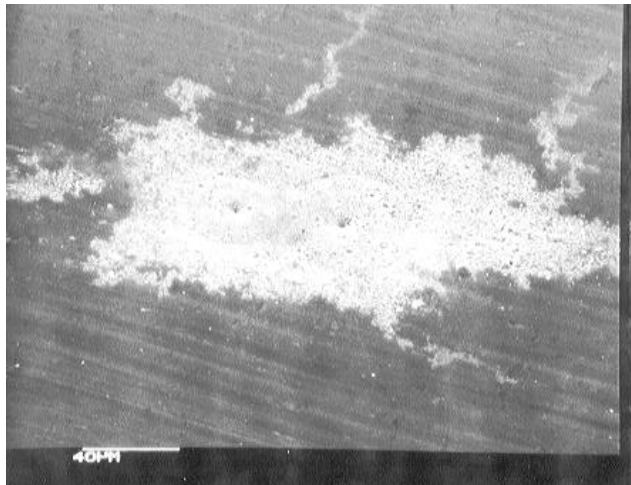


Fig. 8 Aluminum oxide deposited on 6 micrometer thick aluminum from EV boring through aluminum oxide.

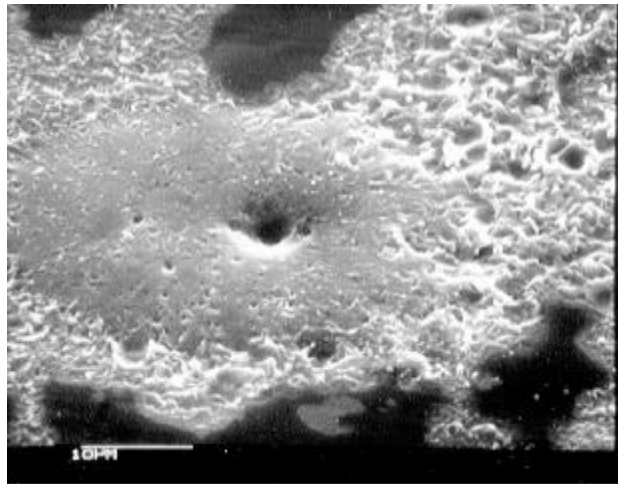


Fig. 9 Magnified view of consolidated aluminum oxide ejected from borehole.

Presumably, the energy required for disruption is less than for melting, as the electrons are not necessarily excited. Evidence supporting this assumption is shown in Fig. 8. This is a micrograph of the material that was deposited on a 6-micrometer thick aluminum foil placed near the exit side of the boreholes in the aluminum oxide. There are two overlapping deposits showing, indicated by a slightly circular configuration, that have an almost electrified appearance. Fig. 9 is a magnified view of one circle of material and it shows a high degree of consolidation for the deposited liquid. There is also the characteristic dimple showing that is similar to the entry side view of an aluminum target, as shown in Fig. 1.

Aluminum oxide has a melting point of 2,050 degrees centigrade and yet, it has not raised the temperature of the thin substrate material in any perceptible way. Even a thin coating of low temperature wax on the surface, to serve as a temperature indicator, remains undisturbed unless the aluminum oxide directly contacts it. Additionally, the surface tension of the aluminum oxide fluid is so low that it runs out to almost an atomically thin edge and there is no indication of evaporation of the aluminum oxide onto immediately adjacent surfaces. This behavior is contrary to what happens when a molten particle of aluminum oxide from a thermal melt strikes the surface. Under this condition, even a particle of a few microns in diameter partly melts into the aluminum foil, has a high contact angle and also evaporates a decoration of aluminum oxide on the immediately surrounding surface.



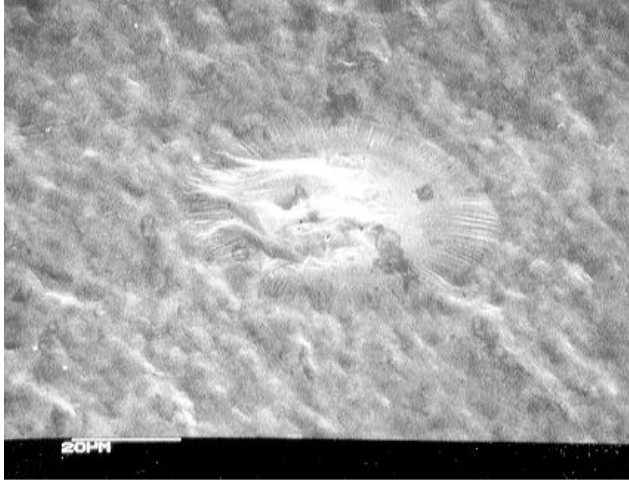


Fig. 10 Backside of a 6 micrometer thick aluminum foil struck with an EV and a deposit of aluminum oxide

The conclusion that can be reached from these observations on disruption is that this is not a very high temperature process and that it does not take much energy to do the job.

Another conclusion concerning the order of events can be found by referring to Fig. 10. This is the backside of the 6-micrometer thick aluminum foil immediately under one of the deposits. What can be seen here is a strike mark similar to Fig. 2 which is characteristic of the exit side of an EV strike. It appears that the EV has transited the aluminum oxide and struck the aluminum foil before the aluminum oxide fluid arrived. This is in line with an earlier conclusion that the EV first disrupts the material by passing through the solid, then liquefies it and imparts momentum to the fluid. In this scenario, the EV is what moves the fluid. Guide the EV and you guide the fluid.

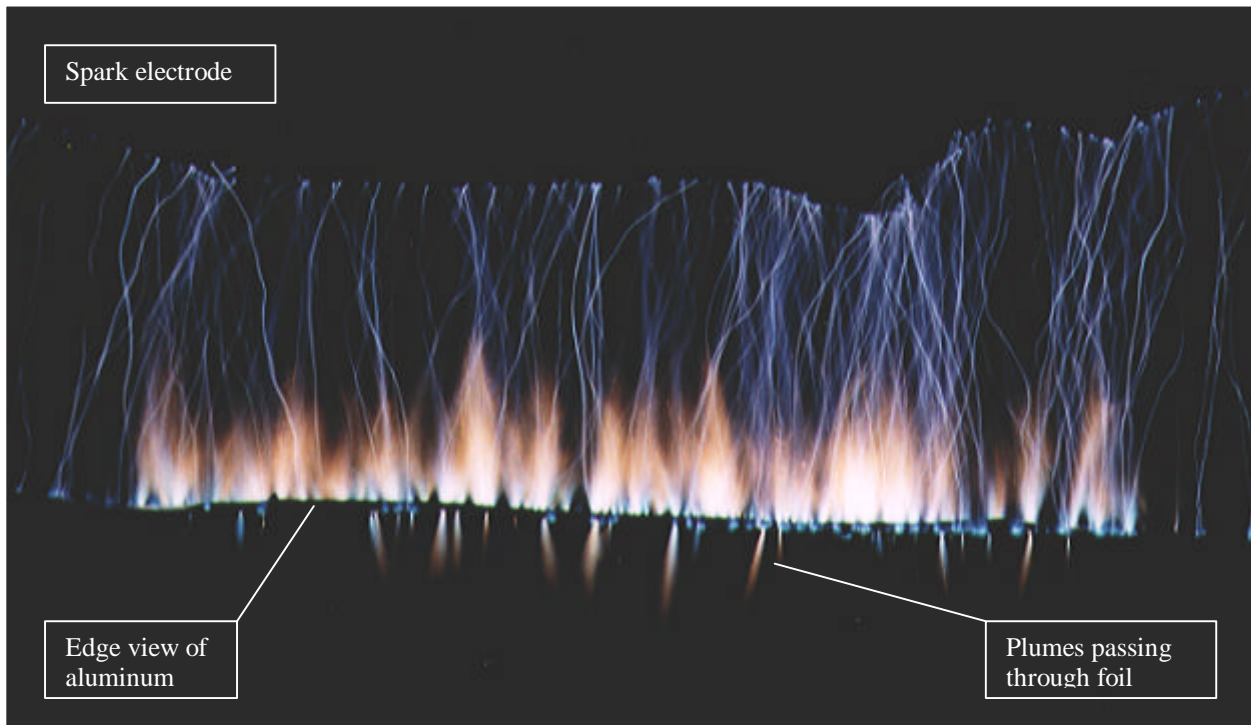


Fig. 11 Time exposure of a side view of a 0.001 inch thick aluminum foil, coated with silicon carbide, being sparked by an induction coil from a moving electrode located at the top of the photo. The small jets seen coming from under the foil have penetrated through it.

### PLAYING WITH SPARKS

The following experiments graphically shed much light on EV energetics and point to a very interesting new light source and deposition method for refractory materials. All that is needed is an aluminum foil coated on one side with silicon carbide grains and an induction spark coil.

Fig. 11 is a side view of the aluminum foil described above that has had a time exposure taken of it as the spark coil is run across the foil sparking on the silicon carbide coated side. The spark, containing an EV, strikes the silicon carbide grains, bores through the coating and gains enough energy to penetrate the aluminum foil and emerge into the air on the other side. In the photo, the sparks start at an electrode near the top of the frame. Streaks are seen running down to the silicon carbide side of the foil that is held edgewise to the camera. In many places jets of light appear past the foil. There are two types of jets showing. One of these is short and blue while the other type has a white-orange appearance.

Several things can be seen on the front side of the foil. At the ends of the foil, both on the left and right side where there is no silicon carbide coating, the strikes do not penetrate at all. In the active center region, the flares coming from the silicon carbide coating are large and are moving backward toward the spark electrode. Reflected material due to sloshing from mismatching the EV causes this spray. The EV penetrates many of the sites but is pulled backwards and carries the material with it.

A typical borehole entry is shown in Fig. 12 for a silicon carbide coating that has been mixed with epoxy to hold it on the aluminum foil. Fig. 13 shows the exit hole in the aluminum foil used to support the silicon carbide and act as

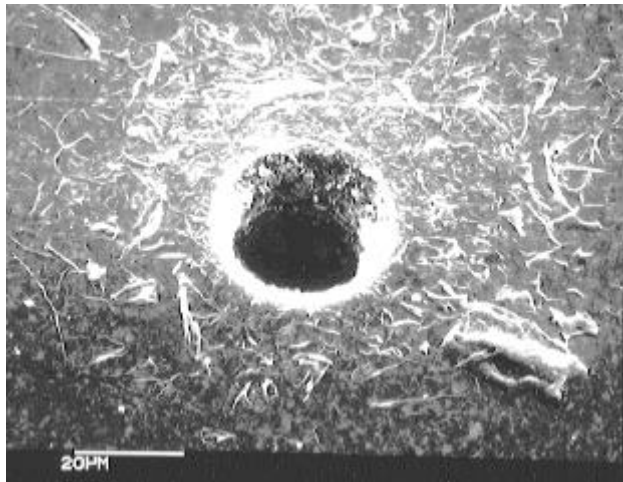


Fig. 12 Entry side of an EV strike on silicon carbide grain coated on a 0.001" thick aluminum foil.



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

a ground for the spark. The borehole is fairly clean for a process that is capable of fluidizing a material with a melting point of 2,600 degrees centigrade and projecting it to an unholy velocity. In fact, when a special test is set up to determine the thermal gradient at the edge of the borehole, one comes to an astounding conclusion: either a gradient of over 26,000 degrees centigrade per micrometer exists here, or this is a non-thermal process.

To arrive at this number for the thermal gradient, I used a very low-melting point material for the silicon carbide binder, and let the EV pass through the composite target. In one example, paraffin wax was used for the binder and both colloidal graphite and silicon carbide were used as fuel in two separate tests. The boreholes produced by EV passage were so perfect that the cusp of the intersection between dual EVs could be seen. This indicates that the entire 2,600-degree temperature drop occurred across less than 0.1 micrometer of space. That is an astoundingly high gradient for essentially bulk material. Therefore it must be something else.

#### DEPOSITION PROCESS

If material from the exit of a borehole is collected on a substrate, such as aluminum foil, it will be found to be deeply implanted in the substrate. Typically, a silicon carbide slug digs in about 20 micrometers. Of course, in the example just cited using an aluminum foil carrier plate, the aluminum plate will also be deposited. An example of a single shot of silicon carbide on aluminum shows in Fig. 14. The high velocity of the deposit not only buries it deeply but

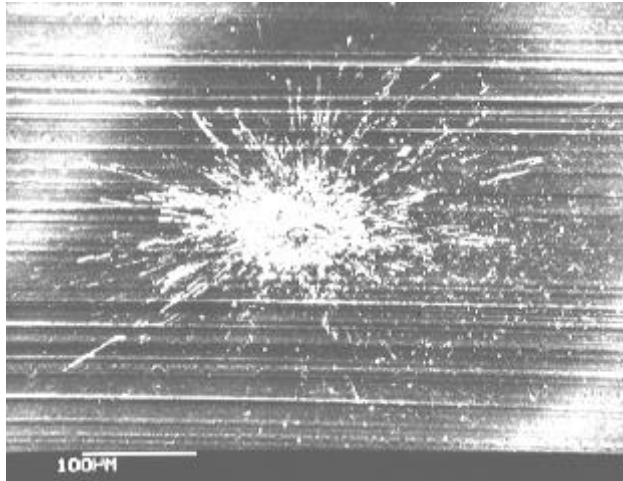


Fig. 14 Single shot of silicon carbide ejected from a borehole into a foil of aluminum.

also scatters it with high energy. Even with this scatter, there is not much material lost, and for some mysterious reason very little shows up in the region of the aluminum exit hole immediately above the deposit. It all seems to be blown sideways.

The appearance of the deposit can be varied over a wide range by velocity control. Fig.14 shows a scattered deposit of silicon carbide and Fig. 8 and Fig. 9 represent coalesced deposits. In adapting this process to a useful technique for producing mechanically robust materials with high efficiency, it is necessary to properly overlap many successive shots. To do this, either a slurry source of material or multiple layers of source material are needed.

### MICRO THRUSTERS

If the source of material propelled by EV action is viewed sideways, small shock cones can be seen coming out of a micro nozzle. The spacing of these cones is typically 70 micrometers at atmospheric pressure. That represents a very high velocity and high specific impulse. The electrical energy input to push a 20-micrometer diameter by 100-micrometer long slug of material to this velocity is only 20 micro Joules.

When a measurement of the ejected particle velocity is made in vacuum using a source that is vacuum compatible, the highest particle velocity found is 1 centimeter in 50 nanoseconds. These particles are detected as ions. There is also a large number of slower ions and neutral particles made at the same time. The propulsion mechanism is not known in detail but it could be similar to those used in xenon clusters excited by laser irradiation <sup>(6)</sup> in that a similar containment mechanism could be used for both. The xenon cluster technique produces particles with megavolt energy levels.

### A FANTASTIC LIGHT SOURCE

If instead of catching silicon carbide on an aluminum foil, as was shown in Fig. 14, we put a photographic film in place of the aluminum, a situation is set up for seeing the photon image of what happens coming out of a borehole. Additional data can be collected if we put a fine-meshed, metal screen over part of the film to act as an object for point projection microscopy. The screen also acts as a filter of radiation allowing us to detect any x-rays present. If incandescent particles come out of the borehole, we also have a recorder for their motion across the surface of the film.

By doing this simple experiment we can collect a large amount of data with little effort. As a matter of fact, all of the data in this paper was collected with an expenditure of less than \$300.00 for all apparatus and material. Of course, it took a lot of time and the data could not be communicated without the microscopy used. Nevertheless, the exploration was carried out with only the most meager apparatus. This is not difficult work and it seems that a lot of this kind of new energy science can be carried out in garages.

When the experiment is set up as indicated, the photographic result shows in Fig. 15. This is a positive image showing white where light strikes the film. Several things can be seen. On the top and upper left there are white spots with streaks emanating from them. The central white spot is where the borehole of ejection was located. This corresponds to the long plumes shown on the lower side of Fig. 11. The silicon carbide hit the gelatin surface of the film and rolled across it leaving trails that eventually stopped, and in some cases, turned back and parked as spherical balls. This is another piece of evidence that the ejected material was not hot enough to harm emulsion although it produced visible light.



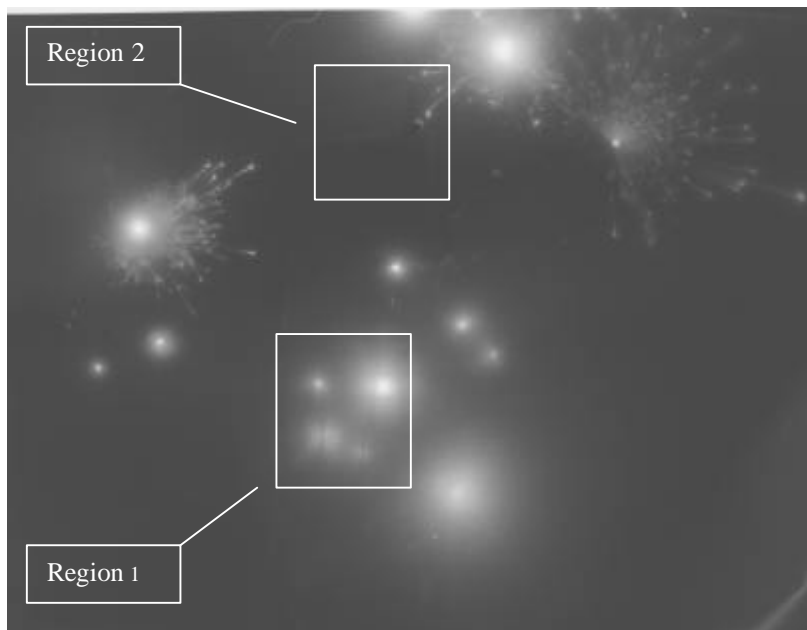


Fig. 15 Positive image on photographic film of silicon carbide ejection from borehole. Point projection images from 200 mesh screen show in outlined area.

Note that some of the white spots do not show any deposited material. This is a fact that was confirmed by careful examination of the emulsion surface. These spots correspond to the short, blue plumes on the lower side of Fig. 11. What happened here is that the EV first emerged and then turned around, due to mismatch conditions, and took the load of fluidized silicon carbide back with it to make a large whitish plume showing on the top side of Fig. 11. In this case, all of the momentum that had been given to the fluid was taken back by the EV and then restored in the opposite direction. This is normally thought to be a difficult job. At the risk of being even more conjectural, I would suggest that someone look at the new rules for mass manipulation in this EV domain.

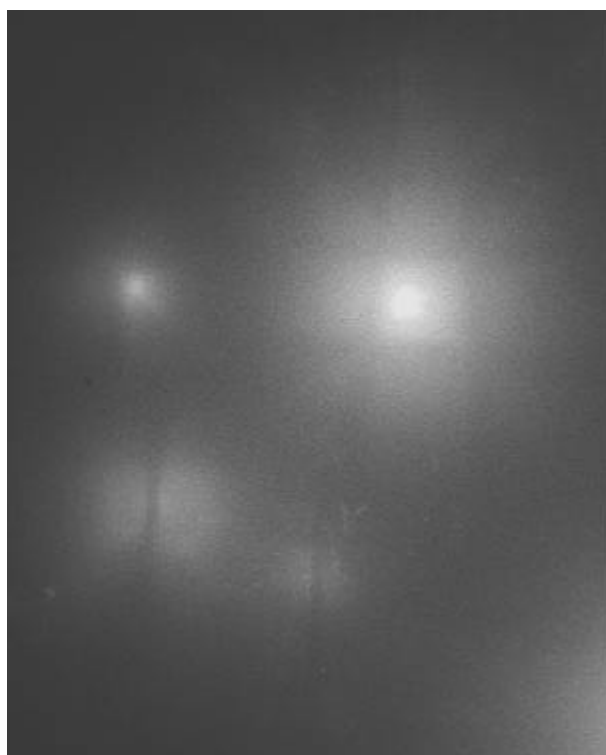


Fig. 16 Magnification of region #1 from Fig. 15

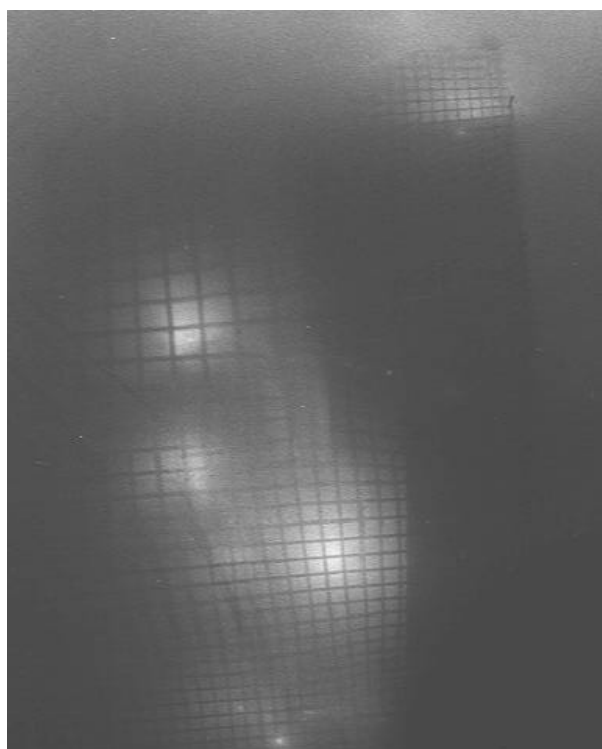


Fig. 17 Point projection magnification of screen image taken from another shot similar to Fig. 15.

There is a grid that faintly shows within Region 2 of Fig. 15. Fig. 18 shows this magnified. This is the edge of a 200 mesh, copper grid having a 0.001-inch wide wire spaced every 0.005 inches. The grid is used for projection microscopy. Region 1 is outlined and magnified in Fig. 16 and is one of the projected images caused by several point light sources produced by the process. Close inspection shows grid images at various magnifications caused by the light source occurring at different distances from the screen. The closest spacing from the screen produces the largest image. Fig. 17 is a similar image from a different shot that has slightly higher contrast and a better grouping of the light sources. The grid distortion is caused by the different magnifications being melded or merged together due to different locations of the light source. In another image magnified from Fig. 15, Fig. 18 was taken from the top section of the screen called region 2. An image of the screen corner can be seen in this photo.



Fig. 18 Magnified view of region #2 in Fig. 15. The lower portion shows an image of the 200 mesh screen used. Many dust specks cast a sharp shadow from the point light generated by EV acceleration.

One of the interesting effects shown in Fig. 18 is the ball of silicon carbide that has come to a stop near the lower right corner of the photo. It stopped near a small conical shape on the surface. There is no thermal damage to the photo emulsion showing here in spite of the high melting point of silicon carbide. Immediately above the cone is a particle of dirt that casts 2 shadows in almost orthogonal directions. These shadows are caused by the two light sources shown coming from off the screen. There are also many other shadows sharply cast from even smaller specks of dust. Each of these particles attests to the size of the light source that illuminated them.

The sharpness of the wire image essentially gives an upper limit of the light source length and the sharpness of the shadow from dust specks give the lateral dimension upper limit. Taking these two bits of data together it can be said that the light source has an upper limit in size of 5 micrometers for both dimensions. This is about ¼ the dimension of the bored channel.

From other measurements we know what the velocity of an EV is under normal conditions. They typically run at about 0.1 the velocity of light in a vacuum guide but slow down according to their interaction with the medium they operate in. Under the operating conditions used here, a turn-around time of several picoseconds is expected. This is an estimate from other measurements and not a direct measurement of existing conditions. This turn-around represents an acceleration of charge that usually produces light emission. It is essentially synchrotron radiation that would produce a wideband, chirping spectrum. The length of the light pulse would thus be on the order of several picoseconds.

It is the turn-around time or stopping rate that exercises a major control over the emission wavelengths. In the geometry used here, where the dimensions are somewhat large and the retarding field is soft, one would expect nothing higher than optical frequencies to be generated and that is what is found by using filters between the light source and the film. The highest frequencies lie in the UV region.

It has been found from past experience that stopping an EV on a low-inductance, high mass material can generate x-rays<sup>(1)</sup>. The stopping rate is high under such conditions. In other experiments, using double EV structures, where shock waves were set in collision, gamma emissions were measured<sup>(7)</sup>. This is a common occurrence that could happen under many experimental conditions accidentally set up and could be the cause behind reports by others on gamma emissions.

The intensity of the light source during its brief life can be estimated from knowing the sensitivity of the film and the distance from the source. These estimates indicate that around 100 billion photons were emitted. This is an extremely intense source for a short period of time.

#### LOW ENERGY NUCLEAR TRANSMUTATION

Data taken from a previous paper presented at a low energy nuclear reaction conference shows evidence of EV transmutation of material<sup>(8)</sup>. Data from this paper are shown in Fig. 19 and Fig. 20. Fig. 19 shows an EV strike on a foil of palladium that had been previously "loaded" with deuterium. When this foil is analyzed in detail with an x-ray energy dispersive analyzer, it shows as clean palladium in all places except those bombarded with EVs.

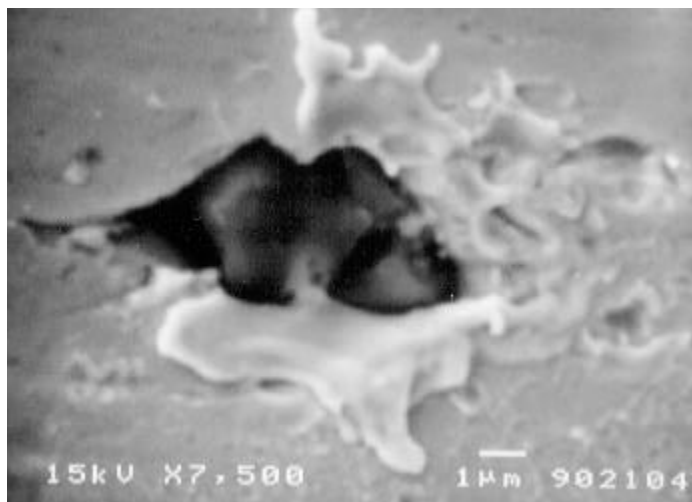


Fig. 19 EV strike on a deuterium loaded palladium foil.

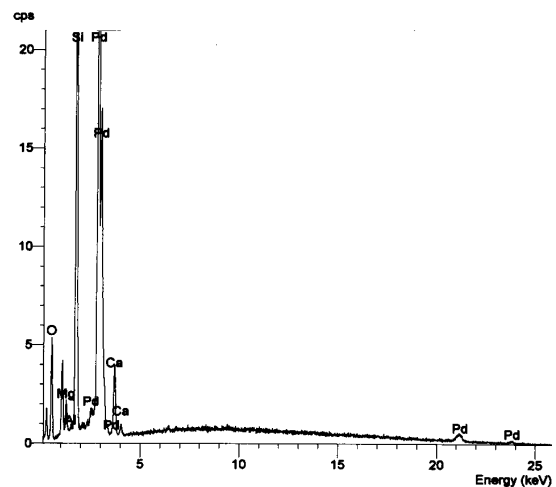


Fig. 20 X-ray analysis of the crack shown in Fig. 19 showing new material produced.

Many of the bombarded areas, but not all, show that nuclear conversions have taken place. The new materials showing are mostly silicon, calcium and magnesium. Fig. 20 is an analysis of the EV damage area shown in Fig. 19. These converted areas typically show a brittle characteristic before bombardment.

It is known from extensive bombardment of pure materials that efficient nuclear conversion cannot be expected from simple, large EV structures. Conversely, when an EV is loaded with nuclei, nuclear conversion does occur but it is not nearly as efficient as the process using a "loaded" substrate. The explanation lies in the need to have very small EV structures for quick stopping. In a loaded material it is likely that fracto emission of electrons occurs arising from the brittle nature of the material. This produces small EVs. Observation of EVs with diameters down to 0.1 micrometers is easily done. Below that value analysis is complicated by the granularity of the substrate material. It is the size range of around 200 angstroms that is of interest for transmutation, however large EVs serve as effective triggers for partly loaded areas capable of producing fracto emission.

#### FREE ENERGY?

Now we come to the main topic of this conference, and at this point our bias will be shown. Theories and ideas have almost no value at all in our world. Laboratory demonstrations are worth very slightly more. These notions stem from trying to sell paper inventions and finding it is a process that stops creative work. To my way of thinking, it is only a properly engineered device that has real value — and that is what we are trying to do.

Throughout much of this work on EV energetics it has been obvious that we get more energy out of certain experiments than we put in. The work being described here also falls in that category, although the engineered version using any of these effects in an energy-producing device falls short of a great thing. The really good stuff for legitimate products is still to come and we are working on it. Trying to market a bad, free energy (or cheap) approach is not good for the field even if it sounds wonderful at first.

Getting a good lab result from an idea and being able to work it into something better is our forte. Making a theory out of good ideas or results is not for us. However, I have to have some vaporous thoughts to hang onto as I go along my path. To do this I have learned that standard words must not be attached to new notions. One invariably bends the work to follow the standard direction instead of taking the new path that is the proper one. An example of this is that, as far as I am concerned, "cold fusion" results may not be nuclear at all when the base cause is found. We see EV processes that are capable of causing similar low energy nuclear reactions as a side effect. I do not know what the base cause for these is, but I am inclined to say a few things bearing on potential energy producing techniques that I use as my own tenuous guide rail.

Take the example of a steam engine that could run without putting any energy into producing steam. As long as everything else worked the same, that would be a pretty good free energy device. We have talked about being able to bring about a phase change, changing solids to gas, by using an EV disrupter. Looks like a steam engine is in here somewhere. Go to a well-known process for producing really high temperatures, such as molecular dissociation and recombination, and use the same type of process to dissociate nitrogen or hydrogen. Can such a cycle really become an engineering reality?

Even though these processes could possibly be made to work, one is still left wondering where the energy comes from. In a search for an answer to this question, I have made sure not to hang a conventional name on the process. Having done this I have complicated the communication of ideas, but that is not a problem as long as we don't talk to anyone until the final machine we have completed communicates the notions for us.

In an effort to get across in this paper the notions that guide me, I am going to fracture conventional words in such a way that some meaning is implied as long as they are not taken too rigorously. I am going to use the notion that the energy excess we see comes from a form of electron annihilation. Of course, I don't mean the usual electron-positron type. Instead, I am going to invoke the latest buzzword and say that it is fractional electron charge I am talking about. If electron fractions really exist, as some experiments by others indicate they do, then I will use the process of their annihilation into electrons for my energy gain.

One of the main requirements is to take the electrons apart in an energetically favorable way. The existing experimental process is said to require a high magnetic field producing a vortical flow of charge. That is likely to exist in an EV.

In another look at the problem from a wider viewpoint, there are several things about an EV that are different enough from conventional theories to lead one to wonder if electrons are contained in their usual form. From many EV measurements it has been found that there is a diminution of expressed charge in an EV. It is easy to account for the number of electrons that go into them and come out. The dimensions are also well known, but classical calculations of surface field are several orders of magnitude below what one would expect. Additionally, EVs have the measured charge-to-mass ratio of an electron, but with the low expressed charge problem, they seem to have lost mass also. There are still a lot of basic things to work out, because at this point, we don't even know if we are dealing with contained electrons or something else.

There is one thing found in common with all energetic processes involving EVs. The EV must be irritated before energy is released in any form. That is possibly why the EV strikes shown in Fig. 11 that land on the bare aluminum do not show any energy release. On the other hand, those that have to irritate their way through the silicon carbide give up much more energy as they regenerate. This observation could be just an illusion caused by a bad power match to the spark. I treat the irritation process as one capable of disheveling an electron into fragments, as only one phase of electron existence, so that these fragments can later unite and release energy. That's also fusion.

Two things are certain: 1) EVs are always involved in any of my processes capable of interesting energy permutations, and 2) lots of new rules are needed to cover new findings. From my viewpoint, I see only a good future for this energy field.

#### ACKNOWLEDGEMENT

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