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Remediation of Radioactive Emissions in Spent Nuclear Fuels using High Density Charge Cluster [EV0] Techniques

By David Yurth

Shortly after Ken Shoulders was awarded his first patent for the discovery and documentation of the phenomenon known at that time as High Density Charge Objects, S-X Jin began working to test the viability of his concept as a means for remediating radioactive emissions from spent nuclear fuels. Between 1994 and 1998, Jin and his associates successfully treated radioactive emissions generated by a solution of finely particulated Thorium oxalate powder in ultra-pure water. The apparatus they developed consisted of a high voltage spark generator, a custom-designed proprietary probe, an anode arrangement to attract the charge clusters, a partial pressure vacuum vessel containing Deuteride gas surrounded by a field of permanent magnets, and a variety of detection and measurement instrumentation devices to monitor various aspects of the process while it was in progress.

Great care was taken to certify that the only constituents contained in the test vessel prior to treatment were water and powdered Thorium. This requirement was satisfied by subjecting each test sample to analysis by a gas diffusion mass spectrometer prior to the treatment protocols. Once the treatment had been completed and the instrumentation array showed radioactivity to be reduced to ambient background levels, the samples were again tested with the gas diffusion mass spectrometer – and the results of those post-treatment analytical samples contained the information which fundamentally validated the underlying thesis about the dynamic processes evidenced by the high density electron charge clusters in this application.

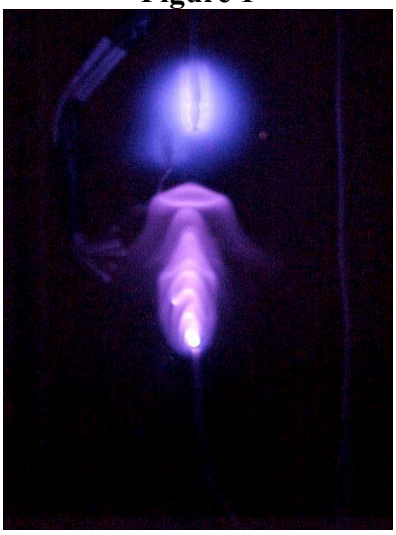
Project Summary

Nuclear Remediation Technologies, Inc., [NRT]'s HDCC-based radioactive remediation project has been designed to advance the state-of-the-art technology [referred to in the literature and the attached documents as High Density Charge Clusters [HDCC's] or Extraordinary Voltage Objects [EVO's]] from the current level of bench-top laboratory prototype tests to five (5) fully configured Alpha prototypes suitable for on-site field testing of solid and liquid high level nuclear waste materials, in three distinct phases, over a period of three years.

The Technology

A document entitled "High Density Charge Clusters Utilizing the Y-Bias Method has been prepared for review and consideration. This document contains a second level review of the technology, including images of HDCC/EVO events taken by electron microscopy and references to existing literature describing research conducted by others investigating this field. HDCC's are a relatively new phenomenon as far as science is concerned. First discovered and subsequently patented by scientist Kenneth Shoulders in the early 90's, a high density charge cluster is the standing wave toroidal soliton which is autopoietically formed by a cloud of electrons emitted under ideal conditions from the tip of a properly constructed cathode probe and propelled towards a target situated contiguous to a properly engineered anode.

Figure 1



EVO Plasma Discharge [Jin][1]

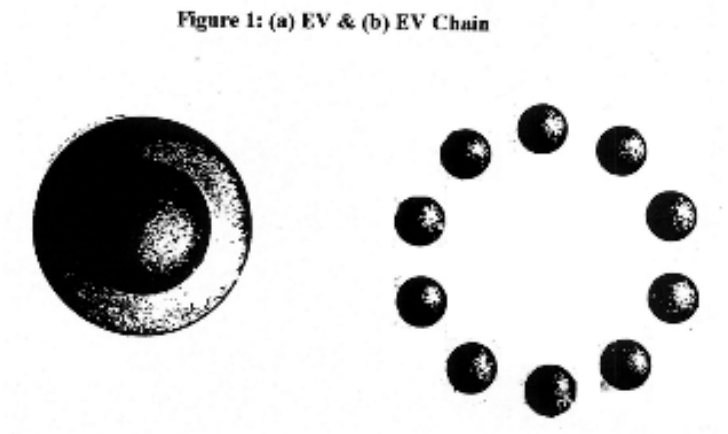
The resulting torus described by Jin and Shoulders in their widely published writings about HDCC's was mathematically replicated by T. Banchoff and his colleagues at the University of Illinois, N. Thompson from Brown University, and D. Banks of the University of North Carolina/Langley Research Center. The computer model they created produces the following three dimensional figure. Notice the dynamic lines of self-organizing flux forces represented by the colored vectors found in their image. Clusters of electrons follow this kind of pathway while maintaining a self-organized, dynamically stable configuration.

Figure 2

T. Banchoff – Flat Torus in 3-Sphere [2]

When viewed through a scanning tunneling electron microscope, the toroid formed at the tip of the cathode assumes one of three forms. The smallest quantum unit measures 1 micron [one millionth of a meter] in diameter. Jack Sarfatti's mathematical treatment of this phenomenon suggests that each cluster measuring one micron in diameter contains a quantity of electrons equivalent to Avagadro's Number [$6.02 \text{ X } 10^{23}$]. When multiple HDCC's are produced under the right conditions, the toroids organize themselves into chains measuring 20 microns and 50 microns in diameter. These sizes of self-organized complexity are quantum in nature – nothing of any other size is found between these configurations.

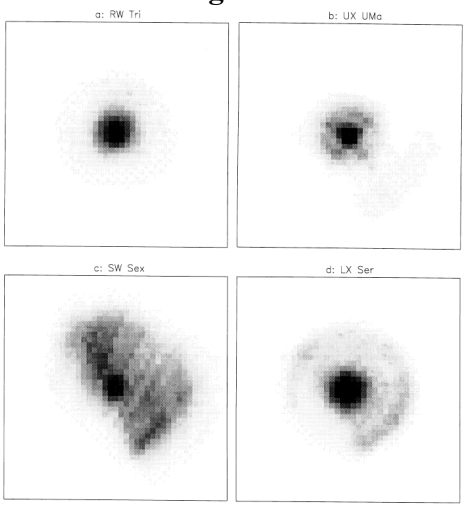
Figure 3



Shoulders Figure 1: (a) EV & (b) EV Chain

This result has been independently verified by scientists at the National Institutes of Science and Technology. This image is found on their web site.

Figure 4



Maps of electron accretion disks at 4410 A^0
[NIST Archive]

The EVO toroids generated by Shoulders and Jin etal are self-organizing across at least three specific scales [1 micron, 20 microns, 50 microns], are stable across significant distances, and can be used to perform deliberately engineered work functions at far lower levels of energy consumption than required for similar applications in conventional nuclear particle accelerators.

In a linear particle accelerator, for example, upwards of 3.5 million electron volts [shown as 3.5 MeV] are required to propel a Proton [1,835 times more dense than an electron] to a velocity of 10% C, with the speed of light @ **299,792,458** metres per second (1,079,252,848.8 km/h).[2]]. In sharp contrast to this level of energetic expenditure, clusters of electrons measuring one micron in diameter can be propelled at the same velocity by exciting the field with 2.5 thousand electron

volts [shown as 2.5 KeV], which is 1,000 times less than that which is required to accelerate Protons to the same velocity in a linear accelerator. What is remarkable about this phenomenon is that when propelled through a Proton-rich environment [e.g., Deuteride gas] toward a positively charged target [anode], EVO's are known to attract and capture [1] Proton for each 100 million [10^6] electrons. Positively charged Protons are mathematically shown to be held in the negatively charged center of the toroid formed by the self-organizing electrons and propelled at the same rate as the cluster itself without requiring additional input of energy. [3]

Figure 5

When the tens of millions of Protons held in the center of the EVO charge cluster impact the nuclei of the atoms making up the target material, the cumulative kinetic effect exerted by the Protons on the nuclear particles is sufficient to temporarily break the weak nuclear force. However, at this velocity [.1 C] the kinetic energy exerted by the Protons at the point of impact is not sufficient to cause a fully catastrophic fission event because, by design, it fails to totally breach the $1/f$ threshold imposed by the van derWaals and strong nuclear forces. What happens instead, as predicted by Y-Bias/Angularity Theory, and as demonstrated in the extensive work performed by Shoulders, Jin and others, is that the nuclear particles temporarily form a plasma, a disorganized 'soup' of nuclear particles in the locale where the nucleus of the impacted atom used to be.

Figure 6

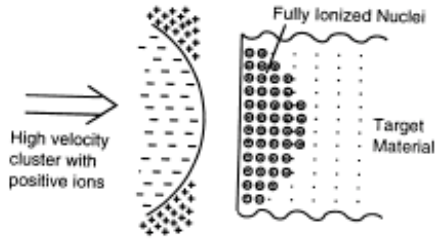
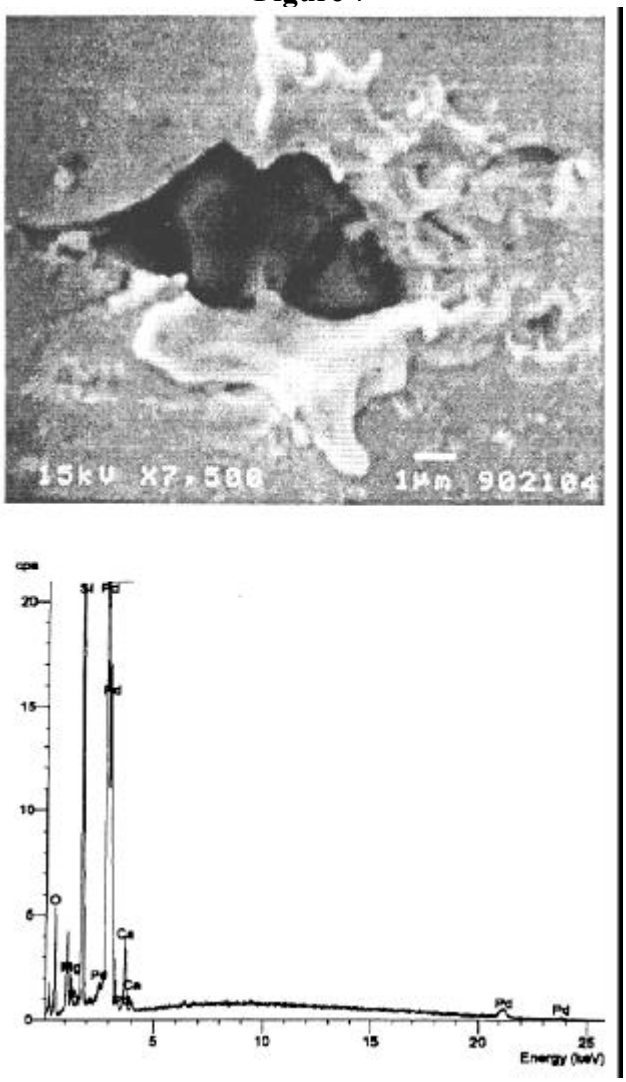


Fig. 2 Charge Cluster Impacting Target

In this instant, prodigious amounts of energy are liberated as a result of the impact of the protons against the nuclear target material, estimated to be in the range of up to nine times the energies

required to accelerate the EVO in the first place. Light, in the form of photons, and heat, in the form of liberated electrons, as well as some neutrons and gamma rays, are emitted as the plasma is formed. Within picoseconds following the collision, however, the nuclear particles re-organize themselves into smaller, more energetically stable nuclear configurations, each manifesting a demonstrably lower half life than that of the original atoms found in the target material. The half-life of radioactive actides has been reduced by 50% as a result of each EVO atomic collision, using this method in controlled laboratory experiments [Hoagy *et al*].

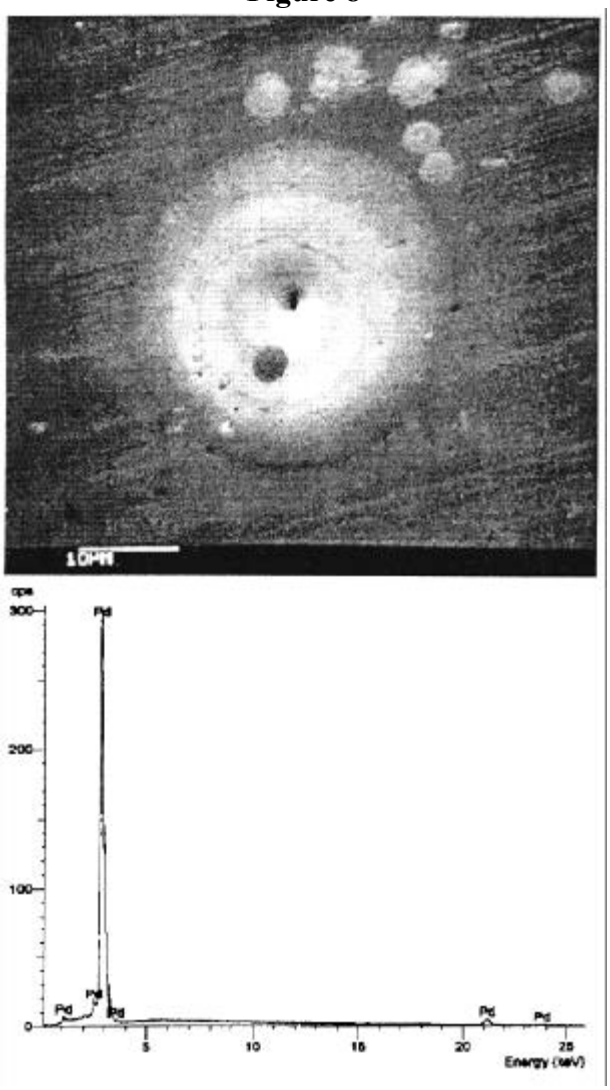
Figure 7



Instead, at the point of impact, light [in the form of highly energized photons], heat [in the form of infrared emissions], gamma rays and small quantities of neutrons are emitted as the result of the disaggregating effect of the collision. Within narrow limits, during the picoseconds following the impact event, the hadrons automatically rearrange themselves to create a nuclear structure which demonstrates a quantum reduction of energy to constitute what is referred to as a more 'steady state,' that is, an atomic condition in which the number and volume of neutrons, gamma

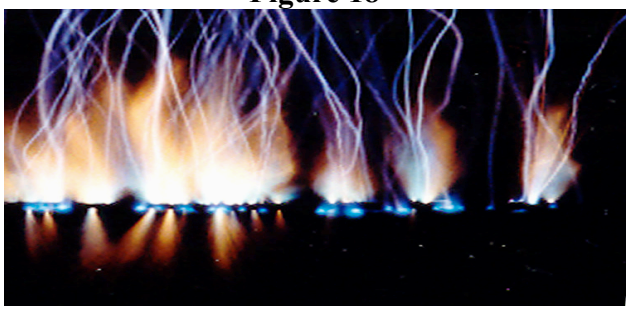
rays and other products of nuclear decay are reduced. This process results in a shortening of the half-life of the target material by 50.0% with each collision and reorganizing event.

Figure 8



By definition, this alteration of the configuration of atomic nuclear structure constitutes transmutation. That is, a product of the EVO/nuclear low velocity collision is the creation of other elements and isotopes, each exhibiting a different atomic number, from the basic building blocks which originally comprised the target material. Jin's experimental results demonstrate the presence of a number of atomically pure elemental materials in the EVO residue after such an impact, which were not present in any of the original target materials, as verified by a gas diffusion mass spectrometer, prior to the procedure.

Figure 18



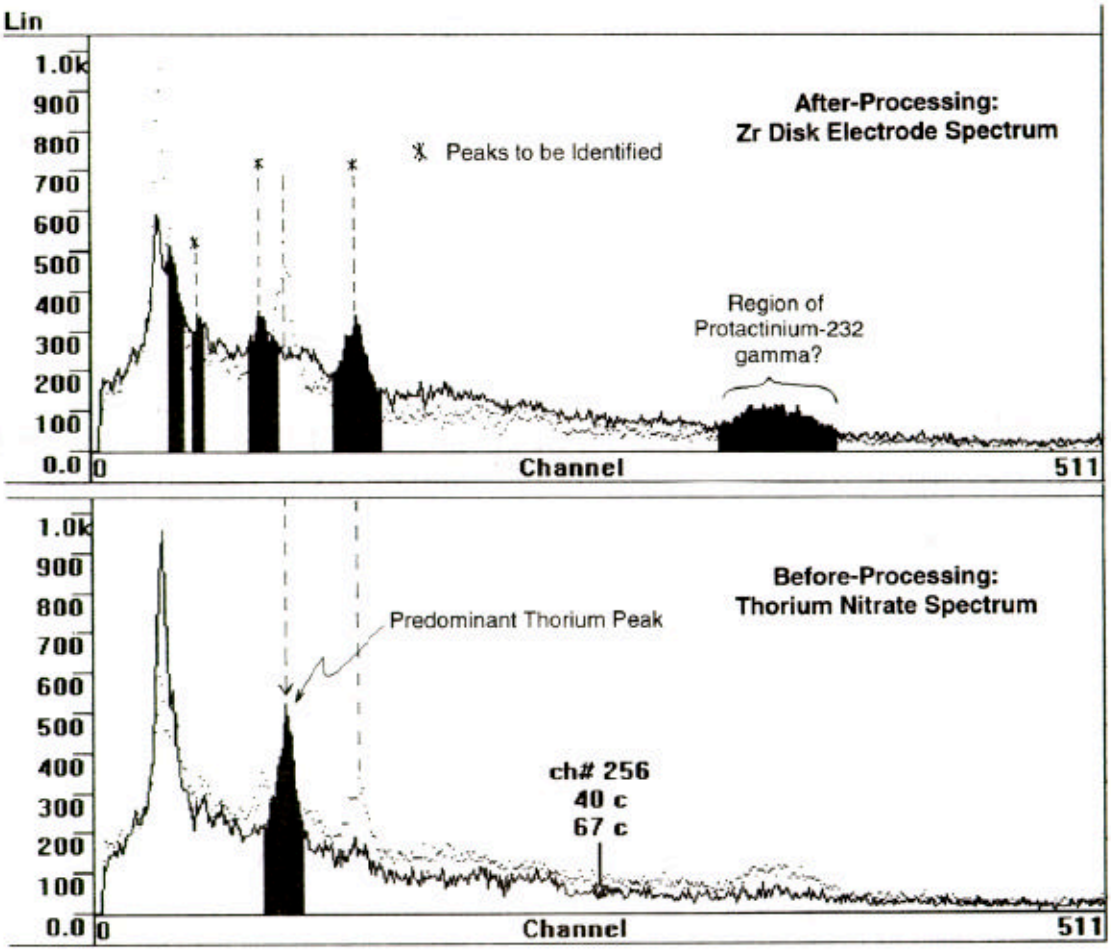
Edge View of Multiple EVO Strikes in Air on an Aluminum Foil Coated with SiC and Epoxy Mix

The multiple EVO strikes [shown in Shoulder's Fig. 18] are caused by an induction coil- driven electrode being scanned along the top side of the foil with a spacing of about .75 inch. In some regions the EVO penetrates the 0.02 inch thick coating and 0.001 inch thick foil carrying the fluid out the back side showing as a flare in the photo. In other cases, the EVO penetrates the coating and foil and then reverses direction carrying the fluidized SiC out the entry direction with high velocity.

The ability to penetrate is tied to having an electrical impedance match for the EVO upon emergence into the space beyond the foil. Deep penetration of the materials depends upon having a form of impedance match between the EVO and the material being bored. The EVO matches the impedance of earth and concrete structures. It does not match highly conductive metals. [Shoulders, 29 June 2005][4]

In controlled laboratory experiments, Jin etal demonstrated conclusively [as Shoulders predicted] that when subjected to a steady, targeted stream of EVO's, the gamma and neutron emissions produced by one gallon of 40% molal solution of Thorium 227 [finely particulated Thorium Oxalate, as found in common camp stove lantern mantel materials] is reduced to ambient background levels in about one hour. Digital images of the target materials taken via tunneling electron microscopy conclusively demonstrate the profound atomic and molecular effects produced by bombardment of any target material with proton-entangled EVO's under controlled conditions.

Figure 9



FIRST LENT-1 GAMMA SPECTRA
Courtesy Trenergy, Inc. [December 4, 1997][1]

The implications of this rigorously demonstrated technology are profound, particularly for those who seek to remediate radioactive emissions emanating from spent nuclear fuels. What this work suggests is that radioactive emissions may be mitigated to ambient background levels with the application of a carefully engineered stream of EVO's in a controlled, proton-rich environment, without the risk of precipitating catastrophic fission events or generating dangerous alpha particles and gamma ray emissions. If developed by competent design-engineering and applications management protocols, devices based on this phenomenon could be employed to safely, permanently resolve the waste nuclear fuel problem on a global scale.

[1] Jin used a Ludlum Measurements, Inc., Sodium Iodide detector, Model 4410-D; the Aptec Autobias PC Card, Aptec Multi-channel analyzer [Series 5000 MCard], and Aptect Basic Display and Acquisition Software [PCMCA/SUPER]. This combination provides a relatively low-cost gamma-ray spectroscope.

[1] Jin, S-X, EVO plasma discharge toroidal structure image, ref.

[2] http://www.geom.uiuc.edu/docs/research/ieee94/node25.html

[3] Shoulders, K., mathematical formulations of EVO's, ref.; see also Jin, S-X, HDCC formulations at scale of one micron, ref. This apparent violation of the 2nd Law of Conservation of Matter and Energy occurs because the field effect generated at the center of the EVO appears to mitigate gravitational effects in that locale, thereby eliminating the more general effect of inertial mass.

[4] Shoulders, K., Electromagnetic Pulse Source Using Fluidized Electrons, Appendix I, found at http://www.svn.net/krscfs/