Cold Fusion by Cherenkov Radiation in a Unique Ceramic

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ABSTRACT

Cold Fusion can be generated by a unique Ceramic of Hydrated Alkali Aluminum Silicates (Ref. 2). We have shown that a standard battery electrolyte can be used with either Lithium or Lead batteries. Some of the major application is to generate clean energy for Unmanned Vehicles, cars and many public transportations vehicles giving them unlimited range of operations.

The difference between our paper and efforts sponsored by DoE, DARPA, at Stanford U. and SRI or in Israel (CBS 60 Minute Documentary), is that we are Generating Electricity Directly. All other Cold Fusion efforts are looking for Excess Heat (currently standing at meager 2-3%), and the measurements are marred with errors. The excess heat has to be converted to steam then to mechanical energy to run a turbine then finally to electricity. According to the laws of Thermodynamics, the best that one hopes to get is 60% efficiency. Therefore the final resulted electricity is $(3/100) \times (0.6)^3 = 6.48 \times 10^{-8}$, is practically BIG ZERO.

Cold Fusion is a forgotten topic since the early1989, when Fleishmann and Pons published their paper. Although the physics of the problem is known from the Quantum Mechanics point of view, no one has been able to duplicate their experiments. We discuss in this paper how Cherenkov Radiation (CR), which results during Cold Fusion processes. Cherenkov Radiation is manifested inside the micro pores of this unique ceramic because of its unique

chemical and microstructure properties. Cold Fusion thus results in generating electric current using standard battery electrolyte and preferably Lithium battery.

THOUGHT EXPERIMENT

Using Einstein's approach of thought experiments (Ref. 2), let us assume a hypervelocity moving at 10km/s impacts the ceramic, and creating a hole in the ceramic of diameter 4 mm. The total energy of the hypervelocity impact is about 40 Joules, and the energy density of is (Joule = 6.2×10^{18} eV). That is 2.5×10^{20} eV concentrated in less than 10 mm diameter at the front end, and 0.3×10^{20} eV at the back end. Since, Cherenkov Radiation results from abundance of relativistic velocity charged particles and high-energy electrons to generate Gamma Rays at the front end, and X-Rays at the back end. (Ref. 2).
As discussed below the same CR process happens inside the micro pores of the ceramic, hence the thought experiment is duplicated in the Cold Fusion process, and it is only a matter of scaling, which is governed by the laws of thermodynamics.

Cold Fusion in the Microstructure of the Ceramic due to Chemical Reactions

Chemical Reactions at the molecular level have significant contribution to the Energy Density associated with cold fusion. The electrolyte in both Lithium Ion and Lead acid batteries is the same –sulfuric acid (Fig. 3, 4). In Cold Fusion, the electrolyte strips the oxygen from the Silica Si_yO_x (see Ref.1, for the same process with Soda-Lime Glass-SLG). The positively charged Alumides in the Ceramic behave the same way as the Si in Soda Lime Glass. These chemical reactions, further contribute to the ionized particles in the electrolyte inside the microstructure of the ceramic. These reactions generate free electrons moving at relativistic velocities in the pores, which result in Cherenkov Radiation. Cherenkov Radiation is a runway process that generates more free electrons and high energy Photons of X-Rays and Gamma Rays in the plasma at extreme pressure and temperature, in the microstructure of the ceramic. In addition, each individual molecular event could result in approximately 0.5eV in an ottosecond, which can be measured by Transition Spectroscopy (Ref.7).

DESCRIPTION OF THE CERAMIC FOR COLD FUSION

The unique ceramic consists of Aluminosilicate (SiO_2 , Al_3O_2), and its chemistry has anion oxides of (AlO_4^{4-} and SiO_4^{4-}), and cations oxides of (Na^+, K^+, Ca_2^+, Mg_2^+) in the crevices of its surface microstructure (Fig. 6). At the molecular scale, the pores are of sizes from 1.83 to 3.9 A°. For illustration, a surface area of 1 cm^2 of the ceramic, with crevices of (1.83- 3.9 A°), has a total surface area of 10^{16} square A°. The cations and anions surfaces generate a charge with the electrolyte through ionic exchange, which imposes on the electrolyte a large charge density reaching 0.5 eV for its ionization in an ottosecond, which can be measured by Transition Spectroscopy (Ref. 7).

At a larger scale the ceramic surfaces has pores of the micron size, which are also charged surfaces comprising anions oxides (AlO_4^- snd SiO_4^-), which are negatively charged, and other cations oxides (Na^+, K^+, Ca_2^+, Mg_2^+), which are positively charged surfaces. When the electrolyte is trapped in the micron level, it generates an electric charge (electrons moving at relativistic velocity) with the same charge density. This charge current generated by ceramic Aluminosiliccates anions and cations, instantaneously interact with the electrolyte. Conventional deuteron fusion in the ceramic is a two-step process, which results in an unstable high-energy intermediary.

Nuclear Fusion

First: at the Quark Level:

The energy in nuclear fusion results from doubly Charmed Baryon, which contains two Charmed Quarks and one Up Quark, which has a mass of 3621 MeV. The mass of the Proton is 938 MeV. The binding energy between the two Charmed Quarks is 130 MeV. This strong binding energy, results in Quark rearrangement, and exothermic reaction, in which two heavy Baryons, undergo Fusion, and the production of two Doubly Charmed Baryon and a Neutron, results in 12 MeV. This reaction in the Deuterium –Tritium (Dt converts to 4He n) occurring in Nuclear Fusion. The two Bottom Quarks have a larger energy of 280 MeV and release energy of 138 MeV (See Nature, 2019).

Second: at the molecular level:

D + D → $^{4}He^{*}$ + 24 MeV

Experiments have observed only three decay pathways for this excited-state nucleus, with the branching ratio showing the probability that any given intermediate follows a particular pathway The products formed via these decay pathways are:

$^{4}He^{*}$ → n + ^{3}He + 3.3 MeV (ratio=50%)

$^{4}He^{*}$ → p + ^{3}H + 4.0 MeV (ratio=50%)

$^{4}He^{*}$ → ^{4}He + γ + 24 MeV (ratio=10^{-6})

The positively charged atoms in the ceramic, which strongly repel one another (Ref. 4) Normally, in the absence of a catalyst such as a muon, very high kinetic energies are required to overcome this charged repulsion. Extrapolating from known fusion rates, the rate for uncatalyzed fusion at room temperature, the energy would be 50 orders of magnitude lower than needed to account for the reported excess heat, muon-catalyzed fusion, result in more fusions, because the presence of the muon causes deuterium nuclei to be 207 times closer than in ordinary deuterium gas. However, deuterium nuclei inside the ceramic crystal lattice are further apart than in deuterium gas. Conventional deuteron fusion in the ceramic is a two-step process in which is unstable high-energy intermediary is formed:

D + D → $^{4}He^{*}$ + 24 MeV

The products formed via these decay pathways are:

$^{4}He^{*}$ → n + ^{3}He + 3.3 MeV (ratio=50%)
$^{4}He^{*}$ → p + ^{3}H + 4.0 MeV (ratio=50%)
$^{4}He^{*}$ → ^{4}He + γ + 24 MeV (ratio=10^{-6})

This result is consistent with the predictions of the Bohr model (Ref.4). Therefore, one watt (1 W = 1 J/s ; 1 J = 6.242×10^{18} eV = 6.242×10^{12} MeV since 1 eV = 1.6. 02 × 10^{-19} joule) of fusion power are produced from ~2.2575×10^{11} deuteron fusion individual reactions each second, which is consistent with known branching ratios, therefore the resulting neutron and tritium (^{3}H) production are consistent with (Ref. 4). This results in ^{4}He production, and thus results in Gama Rays and X-Ray, as discussed in the Thought Experiment.

Cherenkov Radiation causes Cold Fusion in the micro pores of the Ceramic

The interaction of the electrolyte with the ceramic microstructure results in extreme temperature plasma (at the Angstrom and micro dimension), which releases more ionized particles in the electrolyte. This also results in an abundance of very high velocity ionized particles and relativistic velocity electrons, which intensify the Cherenkov Radiation and high energy photons resulting in Gamma Rays and X-Rays in the electrolyte. As the condensed electrolyte exits the pores, the pressure drops suddenly to ambient pressure; it accelerates the ionized particles to the usual blue color of Cherenkov Radiation. The extreme velocity also ionizes the electrolyte, leading to well defined Cherenkov Radiation plume (Ref. 2, 29), as hown in (Ref. 1, see images Cherenkov Radiation and X-Rays and Gamma Rays).

Application of Frank-Tamm Equations to Cold Fusion

In the application of Frank-Tamm equation to Cold Fusion, we cannot use Maxwell's equations, instead ,Quantum Mechanics have to used in order to understand Cherenkov Radiation. Due to the extreme pressure and Temperature, of the Plasma, Bose –Einstein Condensates have to be used. This feature of Cherenkov Radiation (has never been seen before, in the Frank-Tamm Equations.

Bose-Einstein Condensate in Cold Fusion

A Bose–Einstein condensate (BEC) has been studied at extremely low pressure. BEC theory is based on cooling a gas to extremely low density, about one-hundred-thousandth (1/100,000) the density of normal air, at ultra-low temperatures. Bose–Einstein condensate, typically forms a gas of bosons at low densities when cooled to temperatures very close to absolute zero (-273.15 °C). Under such conditions, a large fraction of bosons occupy the lowest quantum state, at which point microscopic quantum phenomena, of particularly wave-function interference, become apparent macroscopically.

The governing equation Bose Einstein condensate is

$$T_c = \left(\frac{n}{\zeta(3/2)}\right)^{2/3} \frac{2\pi\hbar^2}{m k_B} \approx 3.3125 \frac{\hbar^2 n^{2/3}}{m k_B}$$

where:

- T_c is the critical temperature,
- n is the particle density,
- m is the mass per boson,
- $\hbar$ is the reduced Planck constant,
- k_B is the Boltzmann constant, and
- ζ is the Riemann zeta function; $\zeta(3/2) \approx 2.6124$. [12]

Plank Constant = 6.6 x10^{-34} m^2 Kg/s , Boson Density = 125 GeV, Boltzmann = 1.4x 10^{-23} Kg s^{-2} K^{-1}

n = mass density of the particle of the condensate. In our case it is the mass the mass of the electron

The mass density of the electron is 9.1 x 10^{-31}

Under the extreme pressure in the case of Cold Fusion, the plasma density that is extremely high and difficult to calculate.

However, since we know that the temperature T_c to be equal to that of the Sun (5700 deg. K)

Therefore, density of the plasma is of the order of 10^{21} Kg

In the case of Cold Fusion, the temperatures is the temperature at the surface of the Sun (5700 Deg. Kelvin) and the pressure is expected to be manyTera-pascals > 10^{12} TPa. In order to test these conditions, where Bose Einstein Condensate (BEC) applies, it might be possible to test under these conditions at CERN Hadron Collider. BEC theory for the case of Cold Fusion, can also be tested in the region around Black Holes, where both the pressure and temperature are extreme.

TESTING COLD FUSION GENERATED BY THE UNIQUE CERAMIC IN ITS ACTUAL APPLICATION IN A BATTERY WITH ELECTROLYTE

Fig. 5 shows an old battery taken out of service with less than 1/3 of the charge under load. We are supposed to start with a new electrolyte, but because Covid-19, we did not change the electrolyte. Two 12 volt Car lamps were attached to battery and were left until the battery registered 0 on the meter (bottom picture). In the middle column, the ceramic is being poured in the battery cells, and the charge in the battery is starting to increase as we poured more ceramic in the battery cells. After 10 hrs the meter showed an increase in the charge to the end of the red charging sign. Since the electrolyte was never changed, we decided to charge the battery for 10 min more and the meter immediately went to the green fully charged.

The car lamps were then connected and from there on, continued to discharge the battery. After another 10 hrs. of charging the battery the car lamp luminosity exceeded the luminosity we started with by orders of magnitude. The car lamps were left on to run forever, with no loss of charge.

Conclusion

We have shown that **Cold Fusion** can be generated by a unique Ceramic of Hydrated Alkali Aluminum Silicates. We have shown that a standard battery electrolyte can be used with either Lithium or Lead batteries, in order to generate clean energy for vehicles, **Cold Fusion** can be generated by a unique Ceramic of Hydrated Alkali Aluminum Silicates. We have shown that a standard battery electrolyte can be used with either Lithium or Lead batteries. Some of the major application is to generate clean energy for Unmanned Vehicles, cars and many public transportation vehicles giving them unlimited range of operations. In the future, the Cold Fusion technology can be expanded to larger plants for ships, submarines, aircraft, and power plants.

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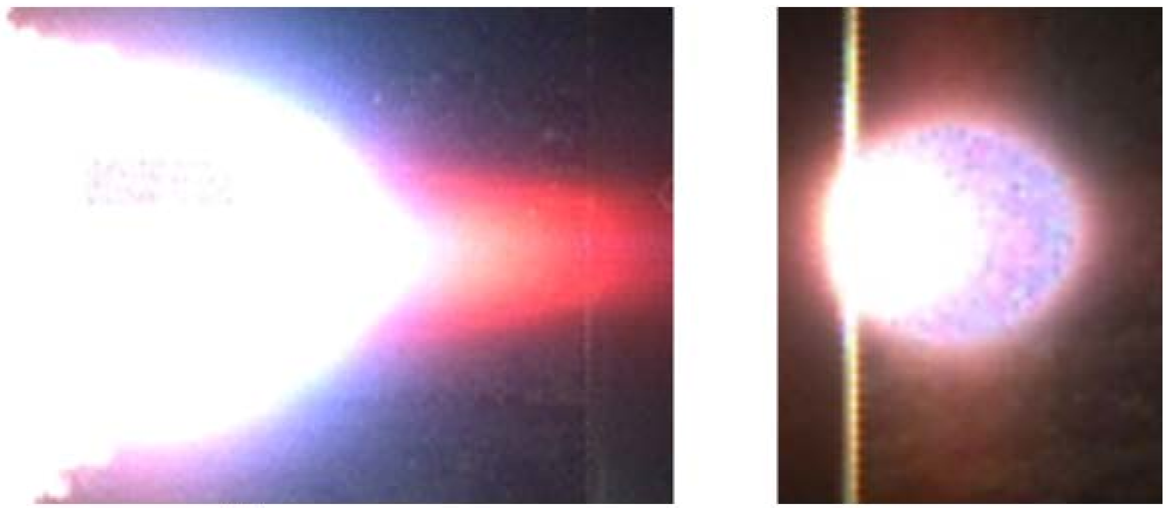
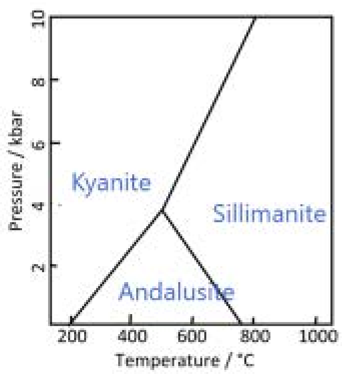


(a) (b)

Fig.1 Cherenkov Radiation plume in Hypervelocity Impact of SLG distinct CR Spectrum followed by charge particle. (a) Gamma Rays and (b) X-Ray radiation



Cold Fusion Ceramic Micro Strucuture

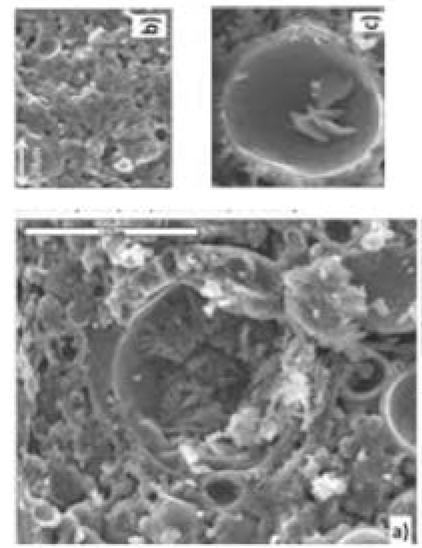


Fig. 2(a) Phase Diagram of Hydrated Alkali Aluminum Silicates
(b) Micro structure of Ceramic at different magnification (Wikipedia)

Lead Ion Battery

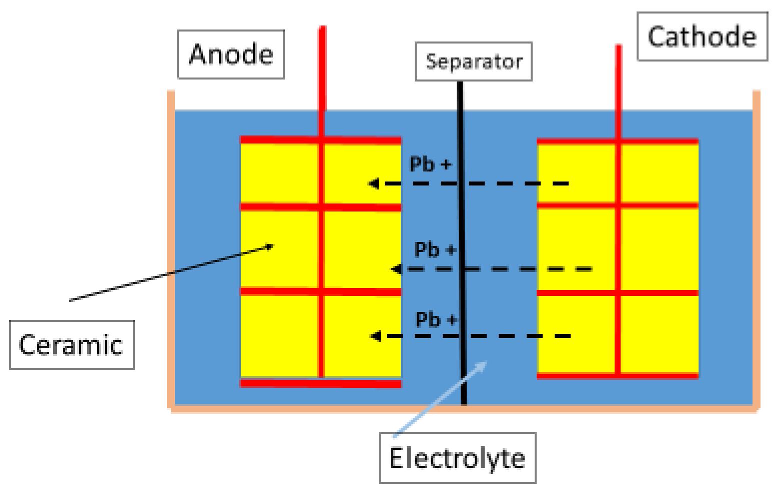


Figure 3 Lead Ion Battery with Ceram

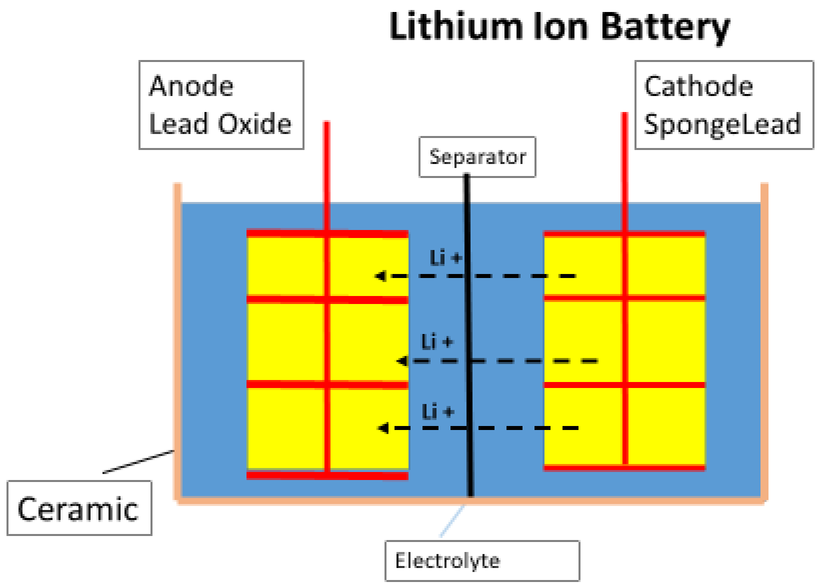


Figure 4 Lithium Ion Battery with Ceram

TISTING OF COLD FUSION IN ELECTRIC POWER GENERATION
Figure 5