

## Excerpted Translations of Alimuhambetova Paper on the Work of Koldamasov

"Research and Development in the Field of Low-Temperature Plasma Physics for Cold Fusion Based on Cavitation Emission of Electrons".

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[Translation for \*New Energy Times\* by Peter Gluck](#)

[The following text is a translation of some of the text from this student paper pertaining to the cavitation work of Alexander Ivanovici Koldamasov. The paper was written in 2005 as an entry in the all-Russia competition "Energy of the Future," sponsored by the Federal Agency on Atomic Energy, Nuclear Society of Russia, Volgodonsk Branch. The full paper, in Russian, with photos and diagrams is [here](#).]

In the year 1972, A.I. Koldamasov, an engineer from the town Kuibyshev (today called Samara, Russia) has published a paper [43] (it is about "ball lightning in liquids") in which he related about the observation of a bright discharge formed when distilled water (with a high specific resistance - greater than  $10^{11}$  ohm-m) is forced to flow through cylindrical holes of 2 mm diameter and length of 25-30 mm, made in a plate of organic glass (poly-methylmethacrylate) or other dielectric material, positioned coaxially in a tube to which it is fed water with a gear pump, up to a pressure of 7MPa.

The glow discharge appeared when at the input edge of the hole made in the dielectric material started an intense hydrodynamic cavitation that has triggered strong resonating pulsations of the water column in the tube between the gear pump and the dielectric plate, with a frequency of 5kHz. Pulsations were induced to the water column by the pump in that each pair of gears, closing down, created a shock. The experimenter had to choose the speed of rotations of the gears for which the frequency of the shocks became equal to the specific pulsation of water in the column.

The glow came from a ring of plasma formation at the input edge of the hole. The color of the glow depends on the material of the dielectric plate: for ebonite: yellow, for organic glass: orange, for asbo-cement: green. Pyrometric measurements have shown that the temperature of the plasma attains  $10^4$  K, and the energy contained is  $10^4$  J/cm<sup>3</sup>. It could be stated that the glow is associated with Rontgen radiation that is dangerous for life. The intensity of the dose at a distance of 10-15 cm was up to 0.85 mR/s and the energy of the quanta 0.3 MeV. After 100 hours of functioning, during that the observed glow was more or less intense, the surface of the organic glass at the input edge of the limiting hole changed color, however no sign of erosion could be observed.

In case if Koldamasov could then guess that he has to measure also the level of neutron radiation coming from this "ball lightning in water" as he then called this

formation of plasma, then he could possibly receive the laurels of Fleischmann and Pons. However he has performed such measurements, described in [44] only in 1989 after the publication regarding the discovery of cold fusion. The density the flux of neutrons for the Koldamasov experiment with the addition of 1% heavy water, at a distance of 10-15 cm from the source is up to 35 sqcm/s.

In the Koldamasov experiments a stabile flux of neutrons is obtained with a global intensity reported to the complete sphere of  $10E3/\text{second}$ . Other people even do not dare to dream about such high results. The author has published results only for the local flux not the global value.

The measurements of Koldamasov have shown that in the area of glow discharge, at the surface of the dielectric material, positive charges are concentrated, while in the "corona" surrounding it, while in the direction of the flux of water- negative charges. The potential of the dielectric material relative to the earth is increasing with the increase of cavitation, and attains +300kV for a cavitation number  $>4$ . During this the current of electrization stream has increased leapwise from 0.01 microAmperes to 0.1 micoamperes for the cavitation number 1.75 and further linearly with the increase of the potential. An even greater influence on the yield of Roentgen and neutron radiation has the purity of water- if its specific resistance is the electric current is also increasing.

During the initial period of his research Koldamasov has supposed that the observed glow is due to sonoluminescence, but later it became obvious that sono luminescence was observed only inside the liquid cavitating in the throttling channel and has a completely different behavior than the glowing plasma cloud. He has observed sonoluminescence even then when the negative potential accumulated on the metallic isolated pipe leading to the throttling plate was not linked to the earth via the microampermeter and when the glow of the plasma formation was extinguished and the Roentgen and neutron radiation has also disappeared. This means that in this case sonoluminescence is not linked to cold fusion if this takes place during these experiments. The merit of Koldamasov is also bound to that he was able to show that not the metallic details exposed to cavitation in water are causing cold fusion, but something else.

At the X-th International Symposium: "Revision of Natural Sciences" (Volgodonsk, Russia, April 1999) [45] the inventor has presented his hypothesis regarding the nuclear processes that take place in his device during the experiments described above. He came to the conclusion that the deuterons in all the processes of cold fusion are not overcoming the Coulomb barrier but are coming near one to other due to electro-neutrality.

A.I. Koldamasov starts from the known theory of the exchange interactions between the nucleons in the deuteron, realized via the virtual negatively charged

mesons. When such a meson generating a neutron after some time in the nucleus of the atom is transformed in a proton, is flying to an other (real) proton in the deuteron, where the distance between the nucleons is significant (because the radius deuteron is 6 times greater than the radius of the nucleon) then for some time it is placed between two positively charged protons. And as the positively charged foils of the electroscope are not more repelling each other when between them it is a negatively charged foil and start to be attracted by it, in the same way the negative charge of the meson in the deuteron is neutralizing the interaction of the positively charged protons in the deuteron. Further the neutral deuteron can interact nuclearly with the nuclei of any atoms from the periodic system of Mendeleev. For this reason, in his opinion, the atomic mass of each element of the periodic system, usually differs from the mass of its neighbor by the mass of two nucleons.

In order that the deuterons should come near to each other and enter the reaction of cold fusion it is necessary first to ionize the atoms of deuterium and then accelerate the positive ions (deuterons) to a sufficiently high speed. All these are accomplished, according to the inventor, in the electric field of high tension formed due to the charging of the surface of the dielectric plate with positive charges. He thinks that the atoms of deuterium from water under the influence of the positive charge of the edge of the hole are losing their electrons. Thus formed positive ions of deuterium in the same field of the edge are accelerated in water and get the kinetic energy necessary for the bombardment of other nuclei of deuterium and entering nuclear interaction without overcoming the Coulomb barrier.

### **Conclusions**

1. The cavitation sonoluminescence in a flux with no generator of ultrasound usually has light-hydrodynamic COP (coefficient of performance) with 5 orders of magnitude smaller than the COP of ultrasound cavitation. The balance of energies for sonoluminescence and a careful calorimetry have not been performed for the previous works. It cannot be excluded that the global yield of heat and light energy is greater than the expended sonic or hydrodynamic energy.
2. In the conditions of non-equilibrium of the shocking waves, it takes place the concentration of the elastic energy of the sonic field in separate molecular associates of water and this leads to their dissociation in radicals, that is necessary for sonoluminescence.
3. In the works of B.V. Deriagin and collaborators during the 1990's it was observed that the ultrasound cavitation in heavy water on a titanium vibrator leads to a weak and sporadic emission of neutrons. The combination of ultrasound and electrolysis leads to a stabilization of the process and gives an emission of neutrons that is 10 times greater than the background level. In the same time the yield of tritium is  $10E7$  times greater than the yield of neutrons and the nuclear reactions are continuing 10 minutes after the stopping of the

ultrasound. An acceptable explanation of the dominant formation of tritium was still not found until now.

4. In 1972, Koldamasov has observed a bright glow (with a temperature of the plasma of  $10^4$  K) from the input edge of the hole made in a dielectric material placed in a pipe where water is fed, at resonance cavitation pulsations. At the dielectric plate it is formed a positive potential up to 300 kV, while the flux of water carries negative charges. The glow is associated with intense Roentgen radiation, and in the case of using of heavy water also an emission of neutrons at an intensity of  $10^3$ /second for many hours of work.

5. It can be supposed that the glow in the Koldamasov experiments is caused by the sonoelectroluminescence in the toroidal cavity formed by the vortexing water at the edge of the orifice. The electric field due to the accumulated charges is intensified due to the difference in the electrical permeability for the cavity and water, and this leads to the accumulation of energy in the cavity. In conditions of non-equilibrium, nuclear reactions can start in the cavity.

6. It is supposed that when the electron layer of the atom of deuterium is tunneling through the nuclei of atoms, then for a given time the nuclei (deuterons) are in a state of electro-neutrality and there is not necessary to avoid the Coulomb barrier for coming in the vicinity of a proton or an other deuteron. Such three-body collisions of deuteron, electron and proton are leading to a new class of nuclear reactions, in that the electron plays the role of catalyst that increases the probability of nuclear reactions, and, especially it is increased the yield of the reaction of formation of helium-3 with no emission of neutrons and the reaction of formation of tritium. This explains the observations regarding cold fusion- that the yield of tritium is higher than the yield in electrons -- that was still now an enigma.

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