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CFP (Cold Fusion Phenomenon) stands for

"Nuclear reactions and accompanying events occurring in open (with external particle and energy supply), non-equilibrium system composed of solids with high densities of hydrogen isotopes (H and/or D) in ambient radiation" belonging to Solid-State Nuclear Physics (SSNP) or Condensed Matter Nuclear Science (CMNS).

This is the *CFRL News* (in English) No. 88 for Cold Fusion researchers published by Dr. H. Kozima, now at the Cold Fusion Research Laboratory, Shizuoka, Japan.

This issue contains the following items:

1. From the History of CF Research (2) — Detection of $^{4}_{2}$He by Morrey et al. (1990)

In the history of CFP (Cold Fusion Phenomenon) research, the cases where scientists working in the established research fields participated in this field are very rare except in the early days of the discovery of the CFP. The investigations of the works in this field by scientists group assigned by DOE in 1989 and 2004 as referred in the previous News No. 87 belong to these cases even if they did not do experiments or calculations themselves.

One of the crucial evidences of nuclear reactions in the CFP is detection of $^{4}_{2}$He accompanied to excess energy. The trial to check the nature of the apparent nuclear reactions in the CFP had been performed as early as 1989 just after the pioneering paper by Fleischmann et al. The Pacific Northwest Laboratory (PNL) presided the six laboratories chosen by the University of Utah (U-o-U) to check existence of $^{3}_{2}$He and $^{4}_{2}$He in Pd samples provided by the U-o-U. Their experimental result was published in the *Fusion Technology* (ISSN:0748-1896) published by the American Nuclear Society [Morrey 1990]. For the benefit of readers, this paper is pasted at this website:

http://www.geocities.jp/hjrfq930/News/news.html

They measured no $^{3}_{2}$He and a scanty $^{4}_{2}$He in the surface region of a width about 25 μm with an amount incommensurate to the reported excess energy from the sample according to the presupposed d – d nuclear fusion reactions [Fleischmann 1989]:

$$d + d \rightarrow t\ (1.01\ \text{MeV}) + p\ (3.12\ \text{MeV}), \quad (1)$$

$$d + d \rightarrow {}^{3}_{2}\text{He}\ (0.82\ \text{MeV}) + n\ (2.45\ \text{MeV}), \quad (2)$$

$$d + d \rightarrow {}^{4}_{2}\text{He} + \gamma(23.8\ \text{MeV}) \quad (3)$$

Their conclusion is summarized as follows:

"*It cannot be proven that the minimal excess heating in one of the rods reported by Fleischmann and Pons can be attributed to the formation of ^{4}He, although the possibility that some ^{4}He could have formed during electrolysis cannot be ruled out. If ^{4}He were generated, the mechanism must be surface related, not bulk related. No attempt was made to measure any helium or tritium hat might have left the cathode surface as gas during electrolysis. The results presented cannot, unfortunately, confirm the existence or nonexistence of cold fusion via helium production. However, they provide a basis for follow-on experiments that should lead to a final conclusion.*"

This conclusion might be accepted, in general, to show the negative evidence against the CFP on the assumption that the mechanism of nuclear reactions in the CFP is the *d* – *d* fusion reaction. However, it is absurd to deny experimental results in contradiction to the presupposed conclusion and to try repeatedly to find a result in accord to it. In science, we have to rely on the confirmed facts irrespective of the supposed anticipation.

When we accept the experimental results frankly and investigate them without prepossession of the reactions (1) – (3), we can construct a model consistent with many experimental data including the one by Morrey et al. [Kozima 1998, 1999, 2006, 2014].

We have to notice here the difficulty in determination of He amount in samples. W.B. Clarke was a specialist in measurement of a trace of helium for instance the blood helium concentration. He was asked to measure the helium content in a sample supplied by M.C.R. McKubre et al. of SRI (Stanford Research Institute). The result was not consistent with the excess energy result obtained in the sample according to the reactions (1) – (3). However, our analysis had given a consistent explanation of the data by Clarke et al. as presented at ICCF9 [Kozima 2002].

The short survey of the history of $^{4}_{2}$He detection given above clearly shows us a simple fact that researches in science ask us to rely on experimental data leaving our presumptions. This proper common sense seems in weak current in the CF research field, unfortunately. We have to be scientific above all else.

Another remarkable result obtained by Morrey et al. is the surface nature of the cold fusion phenomenon (”*If* ^{4}*He were generated, the mechanism must be surface related, not bulk related.*”) . This characteristic of the nuclear reactions in the CFP has been confirmed by many experiments and explained by our model (or used to construct our model) [Kozima 1999].

References:

[Fleischmann 1989] M. Fleischmann, S. Pons and M. Hawkins, "Electrochemically induced Nuclear Fusion of Deuterium," *J. Electroanal. Chem*., **261**, 301 – 308 (1989).

[Kozima 1998] H. Kozima, *Discovery of the Cold Fusion Phenomenon* (Ohtake Shuppan Inc., 1998). ISBN 4-87186-044-2. Section 11.8, "*Generation of ^{4}He and Proton*."

[Kozima 1999] H. Kozima, K. Arai, M. Fujii, H. Kudoh, K. Yoshimoto and K. Kaki, "Nuclear Reactions in Surface Layers of Deuterium-Loaded Solids," *Fusion Technol*. **36**, 337 (1999).

[Kozima 2002] H. Kozima, "An Explanation of Data Sets obtained by McKubre et al. (Excess Heat), Clarke (Null Results of ^{4}He, ^{3}He) and Clarke et al. (Tritium) with 'Arata Cell'," *Proc. ICCF9*, pp. 182 – 185 (2002).

[Kozima 2006] H. Kozima, *The Science of the Cold Fusion Phenomenon*, Elsevier Science, 2006. ISBN-10: 0-08-045110-1. Section 2.8, "*Helium-3 and Helium-4.*"

[Kozima 2014] H. Kozima, "Nuclear Transmutations (NTs) in Cold Fusion Phenomenon (CFP) and Nuclear Physics," *Proc. of JCF14: 14-15*, pp. 168 – 202 (2014). And *Reports of CFRL* (*Cold Fusion Research Laboratory*) **14-3**, 1 – 35 (March, 2014) posted at CFRL website: http://www.geocities.jp/hjrfq930/Papers/paperr/

[Morrey 1990] J.R. Morrey et al., "Measurements of Helium in Electrolyzed Palladium," *Fusion Technol*. **18**, 659 (1990).

2. New Data of Nuclear Transmutation in XLPE (Cross-linked Polyethylene) by Kumazawa et al.

We have given a consistent explanation [Kozima 2008, 2010, 2012] for the experimental data sets obtained in XLPE (Cross-linked Polyethylene) by Kumazawa et al. The data by Kumazawa et al. is specific in that the data is obtained in the investigation of the causes of dielectric breakdown in CV cable by water-tree propagation in XLPE independent of the cold fusion research.

Recently, Kumazawa et al. investigated the emission of X- and γ-rays from XLPE sample in correlation with the water-tree propagation [Kumazawa 2012]. In this paper,

they have shown there appears new elements Pb and Bi and observed γ-rays identified as emitted by ^{214}Pb and ^{214}Bi. This data have shown again existence of similar nuclear transmutations in XLPE as shown in the previous experiments [Kozima 2008, 2010, 2012].

The new data obtained by Kumazawa et al. [Kumazawa 2012] will be analyzed by our model and presented somewhere in near future.

Abstract of the paper by Kumazawa et al. is given here:

(Abstract of the paper by Kumazawa et al. [Kumazawa 2012]

We have observed and reported that weak γ-ray was radiated from water treed samples. ln order to study the influence of inorganic impurities such as metal ions in XLPE on the radioactivity, we measured X/γ-ray and neutron carefully from XLPE samples immersed in NaCl and/or $Pb(CH_3COO)_2$ solution using BF_3, CdTe and NaI detector in the condition of low background radiation. The counting rate of CdTe detector increased linearly with that of NaI detector, but each counting rate was not proportional to the growth of water trees. Furthermore、definitive residual radiation in the water treed samples, which attenuated rapidly to background level within a few hours after beginning of measurement, was observed by a Ge detector. We consider that the γ-ray observed during and after HV applying was emitted from ^{214}Pb and ^{214}Bi, as a result of analysis of the energy spectra. It is, however, difficult to explain that atmospheric radon gas (^{222}Rn) which decays to above isotopes accumulated abundantly in water treed samples, because HV was applied in an air-tight flask filled with the solution. 0n the whole, these phenomena on the radiation of X/γ-ray do not seem to be directly associated with the growth of water trees.

References

[Kozima 2008] H. Kozima and H. Date, "Nuclear Transmutations in Polyethylene (XLPE) Films and Water Tree Generation in Them," *Proc. JCF8* (Kyoto, Japan, Nov. 29 – 30, 2007), pp. 44 – 50 (2008). And *Report of CFRL* (Cold Fusion Research Laboratory) **8–2**, 1 – 15 (August, 2008)

[Kozima 2010] H. Kozima, "An Explanation of Nuclear Transmutation in XLPE (Cross-linked Polyethylene) Films with and without Water Trees," *Proc. ICCF14* (August 10 – 15, 2008, Washington D.C., U.S.A.) pp. 618 – 622 (2010). And *Report of CFRL* (Cold Fusion Research Laboratory) **7–4**, 1 – 10 (December, 2007)

[Kozima 2014] H. Kozima, "Nuclear Transmutations (NTs) in Cold Fusion Phenomenon (CFP) and Nuclear Physics," *Proc. of JCF14: 14-15*, pp. 168 – 202 (2014) and *Reports of CFRL* (*Cold Fusion Research Laboratory*) **14-3**, 1 – 35 (March, 2014): Section 6.2. The latter paper is posted at CFRL website:

http://www.geocities.jp/hjrfq930/Papers/paperr/

[Kumazawa 2012] T. Kumazawa and R. Taniguchi: "A Study on Detection of Weak X/γ- ray with Growth of Water Tree", *IEEJ Trans. FM*, **132**, 1045 – 1052 (2012) (in Japanese with the summary in English)

3. JCF15 was held on November 1 – 2 , 2014 in Hokkaido, Japan

JCF15 (The 15th Meeting of Japan CF-Research Society) was held in Sapporo, Hokkaido, Japan on November 1 – 2, 2014 and 9 papers were presented. The program and abstracts of papers are posted at JCF Website:

http://jcfrs.org/JCF15/jcf15-abstracts.pdf