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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. 80 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. JCF13 was held in Nagoya, Japan

The 13th Annual Meeting of the Japan CR-Research Society was held on December 8 – 9, 2012 in Nagoya, Japan with 20 papers and more than 40 participants. The Abstracts of papers presented at and the Program of the Conference are posted at following pages of the JCFWebsite:

http://jcfrs.org/JCF13/jcf13-abstracts.pdf

http://jcfrs.org/JCF13/jcf13-program.pdf

2. We presented Three Papers at JCF13

We presented the following three papers from the Cold Fusion Research Laboratory (CFRL) at the Conference.

13-12 H. Kozima, "Characteristics of Solid-State Nuclear Track Detectors for Heavy Charged Particles – A Review," *Proc. JCF13* (to be published).

13-13 H. Kozima and M. Tada, "Emission of Charged Particles in the Cold Fusion Phenomenon," *Proc. JCF13* (to be published).

13-19 H. Kozima, "Cold Fusion Phenomenon in Open, Nonequilibrium, Multi-component Systems – Self-organization of Optimum Structure," *Proc. JCF13* (to be published).

In the paper 13-13 presented at JCF13, we have given a consistent explanation of experimental data on the charged particle emission with other data from excess energy to nuclear transmutation obtained in the CFP based on the TNCF model proposed by us.

In the paper 13-19, we stressed simple relations of the cold fusion phenomenon with several fundamental laws of physics. (1) The relation of a thermodynamic law and the distribution of hydrogen isotopes in a host metal is the one of them. As we know well, in an equilibrium system with independent variables V and T, the Helmholtz Free Energy $F(T, V)$ should be a minimum when the system is stable. In PdD_x system, for instance, the interstitial d nuclei occupy both octahedral and tetrahedral sites at a finite temperature to make $F = E - TS$ minimum. Therefore, we have to take into our consideration both d nuclei in octahedral and tetrahedral sites in our consideration of presupposed d-d reactions even if this fact is not considered seriously by now. (2) The second simple fact is the existence of critical density for the cold fusion phenomenon (CFP) as clearly revealed

by the excellent and elaborate experimental data by McKubre et al. published in 1993. The probability y of the simple *d-d* fusion reactions between two d nuclei in neighboring octahedral sites should be proportional to the square of the probability x of occupation of a d nucleus at an octahedral site. The relation $y = x^2$ is easily depicted to show a smooth curve gradually increasing from $x = 0$ without any critical behavior contradicting to the experimental facts. (3) These simple and fundamental considerations suggest the difficulty of simple *d-d* fusion reactions in CF materials similar to those occurring in free space in addition to other difficulties to explain by the reactions. In the presentation at JCF13, we have pointed out these facts and given a possible explanation of the CFP based on the success of the phenomenological TNCF model and accomplishment of nonlinear dynamics. Details of the representation will be published in the *Proc. JCF13* to be published in 2013.

These papers 13-12 – 13-19 will be published in *Proc. JCF13* and also posted at the CRRL Website:

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

Abstracts of these papers are posted at following pages of CFRL website:

http://www.geocities.jp/hjrfq930/News/NewsPrefaces/JCF13abstracts.htm