Kozima Theory Portal

http://newenergytimes.com/v2/sr/Theories/KozimaTheory.shtml

The Hideo Kozima **Trapped Neutron Catalyzed Fusion Theory**

1. Summary of Theory

Fundamental point of view of Kozima's phenomenological approach to the phenomenon, a part of which was first discovered by Fleischmann, Pons and Hawkins in 1989, is to define the Cold Fusion Phenomenon (CFP) as "nuclear reactions and accompanying events occurring in open (with external particle and energy supply), non-equilibrium systems 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). In his approach, a model (TNCF model) with one adjustable parameter has been constructed on the experimental data. Using knowledge of ordinary nuclear physics and solid-state physics, the assumed parameter has been determined consistently when there are more than two data in an experiment. In addition to this phenomenological approach, he found several regularities (laws) between observables which show that the CFP belongs to the science of complexity

2. Highlights of Claims

The experimental data sets obtained in the CFP is beyond understanding if we remain in the established research fields such as nuclear physics, solid-state physics and catalytic chemistry. The most drastic factor in the CFP is the large difference (more than 6 orders of magnitude) between the range of the nuclear force (1 fermi ~ 10^{-13} cm) and the interatomic distance of solids (~ 10^{-8} cm). From our common sense of physics, charged particles with thermal or epithermal energy in the solid can not participate with any nuclear reaction at 1 fermi. To escape the difficulty to bridge the gap, neutron is taken up as a catalyzer of nuclear reactions observed in the CFP. Investigation of properties of neutron in nuclei and in solids, we found there are many mysterious properties of neutrons found in these 20 years that seem to be related to the CFP.

Foundation (existence and properties of assumed neutrons) of the TNCF model, successful to give phenomenological explanation for many experimental data sets, has been investigated quantum mechanically with use of the novel knowledge about neutrons. In the investigation, it has been revealed that the necessary conditions for the

CFP (e.g. formation or self-organization of a superlattice of host atom and H/D) includes complex atomic processes and has to be studied as an object of the science of complexity. This discovery tells us that the CFP is characterized by the qualitative or statistical reproducibility and the lack of quantitative reproducibility (presents in simple systems) generally recognized by researchers in this field is not the defect of researches but righteousness of our research works. The three laws of the CFP reflect this characteristic of the atomic processes to realize the necessary conditions for the nuclear reactions in CF materials.

From our point of view, the science of the CFP is a really new science in the interdisciplinary field between nuclear and solid-state physics related to exotic nuclei with neutron halos and to proton/deuteron wavefunctions not localized in interstices of the lattice of CF materials.

3. Resolution to Huizenga's "Three Miracles of Cold Fusion"

John Huizenga wrote a scathing book denouncing cold fusion research in 1993. He was a professor of chemistry and physics at the University of Rochester, a Department of Energy-funded hot fusion research laboratory. He was also chairman of the 1989 Department of Energy cold fusion evaluation panel that decided cold fusion research was not an area of science worthy of government funding. He mocked cold fusion by alluding to its unexplained characteristics as "miracles." Huizenga's three miracles were:

- Miracle #1: the mystery of how the Coulomb barrier is penetrated
- Miracle #2: the lack of strong neutron emissions
- Miracle #3: the lack of strong emission of gamma or x-rays

Resolution to Miracle #1:

Resolution to Miracle #2:

Resolution to Miracle #3:

A critique to the “DOE Report 1989”, that gives Resolutions to Miracles #1 - #3, was given in the book as follows.

Chapter 1, pp. 5 – 6 of H. Kozima, *Discovery of the Cold Fusion Phenomenon*, Ohtake Shuppan, Tokyo, Japan, 1998, ISBN 4-87186-044-2.

“Let us point out mistakes in the DOE report.

Conclusion (1) is based on Conclusions (2) ~ (5), and it has no basis if Conclusions (2)

~ (5) are incorrect. The issue of excess heat and fusion products discussed in Conclusion (2) has significance only when D + D reaction is assumed as the main process. This assumption was adopted by the majority of the scientists at that time, including those who discovered cold fusion.

If there is some other mechanism governing the process, this argument is no longer valid. If you are searching for truth, whether one assumption made by a scientist is correct or not has no importance. You should search for the truth based on the fact that the phenomenon did occur. From this point of view, we will show, in Chapters 11 and 12, that it is possible to explain the results of cold fusion experiments without any inconsistency.

Conclusion (3) was based on the fact that the cold fusion phenomenon presented poor reproducibility. However, the reproducibility of a phenomenon is determined by the condition of the entire system, in which the process takes place. Simple analogy from other physical phenomena should not have been used to draw a conclusion. We will also show the reasons for the poor reproducibility and the way to improve it in Chapters 11 and 12.

Conclusion (4) only shows that the interpretations of the discoverers of cold fusion were not appropriate, and it has nothing to do with the truth. It is hard to believe that board members have made such an elementary mistake. It was found later that inside solid, such as Pd or Ti, with a combination of various factors, complex phenomena can occur. There is always such possibility in science. Today, it is quite obvious to everybody. The board members might have forgotten for some reason that natural science is build upon the fact.

Conclusion (5) is similar to Conclusion (4). If any new findings had been denied only because they were contradiction with the existing knowledge, there would have been no progress in science and there will not be any progress in the future.

The discussions expressed in the DOE Report remind us Procrustes' bed. As Procrustes used his bed as an absolute standard to measure heights of his captives, the critiques against the cold fusion used $d - d$ reaction as an inevitable standard to judge anomalous events."

The Conclusions of *DOE Report 1989* is cited in Chapter 1 of the book and posted at the CFRL website:

http://www.geocities.jp/hjrfq930/Books/bookse/bookse01/chap1.htm

4. Simple Explanation of Mechanics of Theory

The existence of trapped neutrons in the surface/boundary regions of CF materials,

one of fundamental premises of the TNCF model, is explained following ideas based on novel knowledge of nuclear physics and solid-state physics.

When there is a super-lattice of the host element and the hydrogen isotope (H or D) forming sublattices respectively, halo neutrons in the host nuclei at different lattice points interact with the nuclear force mediated by protons or deuterons at interstices of the super-lattice (and on the own sublattice). The interaction is strong as the direct nucleon-nucleon interaction (and therefore called super-nuclear interaction) and possible to generate neutron bands. The neutrons in the neutron band accumulate at boundaries of the CF material to high densities as 10^{30} cm^{-3}. This state of the band neutron is responsible to various nuclear reactions in the CFP completely different from nuclear reactions in free space investigated in nuclear physics for a century.

5. Informal Articles by Theorist

6. Slides Presentations by Theorist

7. Scientific Papers

H. Kozima, ***Discovery of the Cold Fusion Phenomenon,*** Ohtake Shuppan, Tokyo, Japan, 1998, ISBN 4-87186-044-2.

H. Kozima, ***The Science of the Cold Fusion Phenomenon***: In Search of the Physics and Chemistry Behind Complex Experimental Data Sets, Elsevier, 2006. ISBN-10: 0-080-45110-1.

H. Kozima, "**Physics of the Cold Fusion Phenomenon**," *Reports of CFRL* (*Cold Fusion Research Laboratory*), **11-4**, 1 – 21 (2011).
http://www.geocities.jp/hjrfq930/Papers/paperr/paperr.html

H. Kozima, "**Three Laws in the Cold Fusion Phenomenon and Their Physical Meaning**," *Reports of CFRL* (*Cold Fusion Research Laboratory*) **11-6,** 1 – 14 (April, 2011).
http://www.geocities.jp/hjrfq930/Papers/paperr/paperr.html

8. Issued Patents

9. Visual Examples of Data Correspondence

10. Third-Party References

11. Citations in Other Published Papers or Books

12. In the News Media

13. Non-Reviewed Peer Responses