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Condensed Matter Nuclear Science

"Condensed Matter Nuclear Science" was suggested for the title of a new journal during an extended meeting held by ICCF-9 International Advisory Committee on May 21, 2002. It symbolized the new starting point of this research field after 13 years of world-wide continuous study.

Three coherences were announced in Lerici, ITALY as the theme of ICCF-9, i.e. the coherence between CONDENSED MATTER PHYSICS and NUCLEAR PHYSICS; the coherence between "hot fusion" and "cold fusion"; and the coherence between application and fundamental research. This conference is organized according to the theme.

The first is the ***coherence between CONDENSED MATTER PHYSICS and NUCLEAR PHYSICS***. Indeed Professor Martin Fleischmann has traced back to 1960's for the historical motivation of this research [1]. Dr. Iwamura of Mitsubishi presented most convincible experimental results to show such a coherence: when a deuterium flux is induced by the multiple–layer thin-film structure on the surface of palladium, nuclear transmutation would happen reproducibly[2]. Professor Takahashi of Osaka University showed also that the 3-body nuclear reaction might be greatly enhanced if the highly deuterided titanium target is cooled during the beam-target experiments [3]. Both of these experiments clearly showed that the nuclear interactions might be affected by the condensed matter physics.

Secondly, the ***coherence between "hot fusion" and "cold fusion"*** should be emphasized, because both are working for a clean and inexhaustible energy source. Most of the "hot fusion" scientists do not realize that both of "hot fusion" and "cold fusion" need the resonant tunneling to enhance the fusion cross-section. They always believe that the kinetic energy of hot fusion plasma is necessary to overcome the Coulomb barrier between positively charged deuteron and triton. This has been a great mistake for 50 year fusion research [4]. Indeed the kinetic energy is effective only when there is a resonance energy level for deuteron-triton fusion. Only if they understand the importance of this resonance; then, they are able to understand why the "excess heat" in the low energy nuclear reaction are never accompanied by the strong neutron or gamma radiation. Fortunately, the open mind fusion scientist, Dr. Thomas J. Dolan, started to assist fusion community for a better understanding between "hot fusion" and "cold fusion" physics [5].

Thirdly, the ***coherence between application and fundamental research*** is necessary to promote this research. This is almost the only way to break through the barrier between the main stream science and this research. If we look at the difficulties for the SCIENCE magazine to publish the "Bubble Fusion" paper, we will understand the necessity of a demonstration device which will show the application of "Condensed Matter Nuclear Science". Fortunately, the Great-Wall Ti-Gold Company made a big stride forwards in this direction.

We emphasized 3 key factors for these 3 coherences as well, i.e. the deuterium(hydrogen) flux, the multiple-layer thin-film technique, and the infrared thermal imaging technology.

Flux is more important than deuterium (hydrogen) loading ratio in metals. This has been recognized by more and more experimentalists. This should be important to solve the problem of reproducibility.

Multiple-layer thin-film is an effective technique to enhance the flux. Dr. Wolf-Dieter MÜNZ, Materials Research Institute at Sheffield Hallam University, UK, showed his great interests in solving the flake-off problem in multiple-layer thin-film. This is important to establish a self-sustaining "excess heat" device.

Infrared thermal imaging technology has been proved to be a good diagnostic tool, which has enough time and space resolution and has no interference to the D(H)/Pd system, in order to search for the best set of the parameters.

The Italian scientists at Frascati have shown that the power density of a D/Pd system might be as high as 600 kW/c.c[6]. This is very close to the theoretical limit (MW/c.c.). What we have to do is to search the best set of the parameters, and scaling-up the device. Our mission is to put interesting, potentially important science into public view.

Acknowledgements

Since we are going to publish a selected work based on the proceedings, we decided to publish all the manuscripts received although some of these manuscripts do not meet the requirement set by ICCF-9 in advance.

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Xing Zhong Li, December 25, 2002