On Otto Reifenschweiler's experiment "Reduced Radioactivity of Tritium in Small Titanium Particles"

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I have read Otto's above paper in *Phys. Lett. A.*

The essential point of the paper is that, when tritium is absorbed in titanium monocrystalline particles with diameters of about 15 nm, (1) for $TiT_{0.0035}$ radioactivity reduces 60% with a change of temperature of between 20 and 360° C, and (2) for TiT_x (x = 0.5 to 6 times 10^{-4}) radioactivity reduces to 50% with the change of x.

I have asked about the reliability of Otto's experiment (as it is always important to assess experimental results) of my friend, Professor K. Hasegawa of the Research Institute for Radiochemistry of our University, an expert in tritium measurement. I had a positive answer for Otto's experiment from him, but for one point on the X-ray measurement by GM counter. Usually, X-rays are not measured by GM counter and it is necessary to check strictly the efficiency of the measurement of X-rays by GM counter.

My comment on Otto's experiment is on the basis that, in my opinion, it is possible the decay time of an unstable particle in its free state can change its radioactivity by interaction with other nucleons.

Recently, I have written a paper, and submitted it to a journal, on neutron bands in solids predicted at ICCF-5. In this paper, it is shown with a simple model that a neutron as a wave can exist stably in a crystal with energy band structure. When a neutron is in an allowed band, the neutron standing wave interacts with nuclei on the lattice points. It is reasonable to guess that the interaction influences the decay time of neutrons, possibly to elongate it. This is a new "Solid State Nuclear Physics" after the Mössbauer effect.

Quantitative treatment of the elongation of lifetime by the neutron-nucleus interaction is not obtained yet. It is a possibility graspable from physical considerations. If the transition is determined by the energy difference between the final and initial states, it is obvious that the neutron in the band is more stable than a proton standing wave in the lattice until its wave function shrinks to the final state, an occluded hydrogen atom in an interstitial site of the lattice. However, the transition of the proton standing wave to its final state will make an overall transition probability from a neutron wave to a hydrogen atom on an interstitial site via the proton standing wave very small. The process will make the lifetime of a neutron in a lattice longer than the free state value of 900 seconds.

The problem of tritium in titanium is of course different from that of a neutron in palladium (or titanium). The reason I have mentioned the above example is to point out that there are many possibilities for the reduction of radioactivity in tritium in a solid, one of which may be the mechanism pointed out in Otto's paper, triton pair formation.

Anyway, it is certain that we are standing in front of a wide and profound ocean of new science, "Solid State Nuclear Physics." This is a very lucky and happy situation for a scientist, comparable to our ancestor from 16 to 17 centuries and at the beginning of the twentieth century.

Have nice days with success in cold fusion research!

Brief Comments from the ICCF-5 Discussion Group

Subject: ICCF-5 abstract by Otto Reifenschweiler

Bill Page

Apropos tritium in metals is the apparent temperature dependence of the radioactivity of tritium observed by Reifenschweiler. Reifenschweiler gave an oral presentation at ICCF-5, but my notes from the meeting do not indicate that he revealed any new results in this area. Apparently several efforts are on going to attempt to reproduce the result.

Follow-up Experimentation

Roger Cox, Ph.D.

. . . I work in a nuclear engineering directorate at Sandia National Laboratories in Albuquerque NM. My specific interest is in the effects cited by Otto Reifenschweiler of reduced beta decay in tritiated titanium—we are doing some follow-up experimentation. I guess that makes me a CF "fellow traveler."

from Report on ICCF-5 ("*CF*" #10)

Olof Sundén

O. Reifenschweiler, from Philips Research Laboratories in the Netherlands, gave an interesting paper regarding the decreased radioactivity of tritium when confined in a Ti lattice. This is also a discovery in severe conflict with present physical theories. It seems to indicate that radioactivity may be a causal process, depending on energy fluctuations in a still unspecified aether, and not the statistic-probabilistic process presumed by present physics.