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[Print Version]

Many happy returns for cold fusion

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Twenty years to the day that two chemists ignited controversy by announcing signs of cold fusion at an infamous press conference in Utah fresh claims by a separate team was made this week, again in Utah. This time the researchers have been careful to avoid the pitfalls the led to the original claims being ridiculed and dismissed out of hand.

Back in 1989, Martin Fleischmann and Stanley Pons at the University of Utah announced the tantalising prospect of abundant, almost-free energy, from nuclear fusion. Their claims were dismissed by nuclear physicists, not the least because the reactions normally occur at the high temperatures and pressures inside stars..

Now Pamela Mosier-Boss and colleagues at Space and Naval Warfare Systems Command (SPAWAR) in San Diego, California, are claiming to have made a "significant" discovery clear evidence of the products of cold fusion.

On 23 March, the team presented its work at the American Chemical Society's spring conference in Salt Lake City, Utah, a few months after the study was published in a peer-reviewed journal (Naturwissenschaft, DOI: 10.1007/s00114-008-0449-x).

Using a similar experimental setup to Fleischmann and Pons, the researchers found the "tracks" left behind by high-energy neutrons produced in the fusion reaction between deuterium and tritium nuclei. The team used a low-tech particle detector: a plastic called CR-39 which they placed in contact with a gold or nickel cathode in an electrochemical cell. After passing a current through the cell for two of three weeks, the team found a small number of "triple tracks" in the plastic: three 8-micrometre-wide pits radiating from a point (see diagram, top right).

Mosier-Boss's team say the pattern is the result of a high-energy neutron striking the nucleus of the carbon atom inside the plastic and shattering it into three charged particles. No such tracks were seen if the experiment was repeated using normal rather than heavy water.

Johan Frenje at the Massachusetts Institute of Technology, an expert at interpreting CR-39 tracks produced in conventional high-temperature fusion reactions, supports the teams interpretation.." I must say that the data and their analysis seem to suggest that energetic neutrons have been produced," he says, although he points out their data set is small..

Whether this is the result of a nuclear fusion reaction is more controversial. Because

normal chemical reactions do not produce high-energy neutrons, Mosier-Boss suggests, they are could have been created as a by-product of the fusion of deuterium and tritium nuclei crammed together at the cathode.

Some researchers in the cold fusion field agree. "In my view [it's] a cold fusion effect," says Peter Hagelstein, also at the Massachusetts

Others are not convinced. Steven Krivit, editor of the New Energy Times, has been following the cold fusion debate for many years and also spoke at the ACS conference. "Their hypothesis as to a fusion mechanism I think is on thin ice, he says. This is an unfortunate distraction from their excellent empirical work,"

Krivit thinks cold fusion remains fantasy. He views Mosier-Boss' work as evidence of low energy nuclear reactions, which he says can be explained by mechanisms other than cold fusion.

********** END OF PRINT VERSION ARTICLE **********

For unknown reasons, New Scientist decided to omit the alternative ***nuclear*** hypothesis in their print version. The following three paragraphs appeared in the New Scientist online version, but not the print version.

********** OMITTED TEXT FROM ONLINE VERSION **********

Alternative theory

Others, though, are not convinced. Steven Krivit, editor of the New Energy Times, has been following the cold fusion debate for many years and also spoke at the ACS conference. "Their hypothesis as to a fusion mechanism I think is on thin ice … you get into physics fantasies rather quickly and this is an unfortunate distraction from their excellent empirical work," he told New Scientist.

Krivit thinks cold fusion remains science fiction. Like many in the field, he prefers to categorise the work as evidence of "low energy nuclear reactions", and says it can be explained without relying on nuclear fusion.

In 2006, Allan Widom at Northeastern University in Boston and Lewis Larsen of Lattice Energy, LLC, suggested that the key to the process was oscillating surface plasmons – waves of energy rippling through electrons on the surface of the electrode.

They said that the rough surface of the palladium on the electrode focuses the energy into small pits, where it can be transferred to a single electron. The high-energy electron can then shoot into the nucleus of a nearby deuterium atom and combine with a proton to release a neutron and a neutrino (European Physical Journal C, DOI: 10.1140/epjc/s2006-02479-8).

"Electrons and protons don't have trouble attracting," Widom told New Scientist, and he says the explanation conforms to the Standard Model of particle physics. He speculates that this theory could explain instances of exploding laptop batteries, and could be harnessed as an energy source – something Larsen's company hopes to commercialise.

CORRECTION PRINTED

The article "Many happy returns for cold fusion" contained a subtle but significant ambiguity (28 March, p 10). The article mentions my scepticism of "cold fusion" as a theoretical explanation for the low-energy nuclear reaction experimental phenomena, but fails to mention other theoretical models for these phenomena which also propose nuclear processes, namely, neutron-catalysed weak interaction processes. According to several experts, at least one of these models appears to be a viable explanation.