

Low-Energy Nuclear Reaction Research – 2009 ACS Update

Steven B. Krivit
Editor, *New Energy Times*
Executive Director, New Energy Institute

American Chemical Society
Salt Lake City, Utah, March 22, 2009
8:55a.m. -- Hilton -- Alpine Ballroom West

1989 – 2009 Big Changes

- **Stigma Worn Off ***
 - Experimental work – hard proof
 - Possible theoretical model to explain LENR
(* For people who have kept up to date)
- **Journals – “Gatekeepers”**
 - Top Echelons – no
 - Reputable Journals – yes
 - U.S. Physics Journals – no

Signs of Progress

- **ACS / Oxford Univ. Press**
 - LENR Sourcebook Vol. 1, Vol. 2
- **Real Encyclopedias**
 - Elsevier, John Wiley and Sons (in press)
- **Dept. of Defense, Energy**
 - Undisclosed Meetings
- **Hell Freezes Over!**
 - Bob Park, U.S. physics spokesperson
...Some real physics
...Friends working on it

New Instability and Conflict

- **LENR Proposed Theory – Widom-Larsen**
 - “...may prove to be a viable mechanism”
 - Dave Nagel, Chairman of ICCF-14
 - “Now a viable theory”
 - Dennis Bushnell, Chief Scientist, NASA Langley
 - “...as far as I can tell correct”
 - Dave Rees, Particle Physicist - Navy SPAWAR
 - “...I didn’t say it was wrong”
 - Richard Garwin, Nuclear Physicist

New Instability and Conflict

- **Widom- Larsen**
 - “inconsistent with the general behavior of the LENR phenomenon”
 - [REDACTED], Radiochemist, Ex-employee
 - “Crazy, Misguided, Unethical”
 - [REDACTED], Cold Fusion Theorist
 - “We see a disaster...looks like a snow job.”
 - [REDACTED] and [REDACTED], Cold Fusion Theorists
 - “does not sit well with the observations of countless experimenters ... very few neutrons..”
 - [REDACTED], Cold Fusion Theorist

Terminology - Disclaimer

- **2009 Perspective – Field still evolving**
- **“The following opinions are not necessarily reflective of the management...”**

Terminology - 2009

- “Cold Fusion”

A highly speculative, little-supported process by which two like-charged atomic nuclei overcome the Coulomb barrier at normal temperatures and pressures

Terminology - 2009

- “Low-Energy Nuclear Reactions”

Research and experiments that take place at or close to room temperature and pressure which produce nuclear-scale energy and nuclear products. LENR does not presume a fusion mechanism that involves surmounting a high-Coulomb barrier.

Terminology - 2009

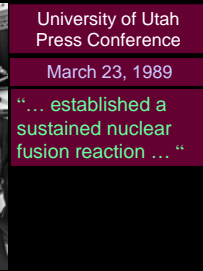
- “Condensed Matter Nuclear Science”

The field of research for LENR studies

Utah N-Fusion Announcement



Martin Fleischmann
University of Southampton



Stanley Pons
University of Utah

University of Utah
Press Conference
March 23, 1989
“... established a
sustained nuclear
fusion reaction ...”

1989 History – Failures

- May 1 – Parker- (MIT)
“Fraud”
- May 1-2 – Koonin - (Caltech)
“Incompetence and Delusions”
Lewis- (Caltech), Myerhof - (Stanford)
“Nothing There...Thermometer Error”
- May 2, 1989 – Pons’ Mtg. with Bush Cancelled

1989 History –Successes

- April 14 – V. Eden/ W. Liu - (U. Wash.) Tritium
The New York Times
- April 19 – Bob Huggins (Stanford) Excess Heat
The New York Times
- April 24 - John Bockris (TAMU) – Tritium
JEAC Oct.
- Sept. – John Bockris (TAMU) – Excess Heat
Electrochimica Acta
- Oct. – Fleischmann and Pons
- Excess Heat in 23/28 Cells
NSF/EPRI Workshop

Strengths of Fusion Claim

- Nuclear-Scale Rates of Energy
- Neutron, Helium-4, Helium-3, Tritium Production
- 4He Temporally Correlated to Heat

Other neat nuclear stuff...

Indirect Evidence

- Unequivocally nuclear
 - But Fusion?
- Circumstantial Evidence
- Imaginary Physics

Why Doesn't "Cold Fusion" Look Like Hot Fusion?

"The circumstances of cold fusion are not those of hot fusion"

- Julian Schwinger

Why Doesn't "Cold Fusion" Look Like Fusion?

"The circumstances of cold fusion are not those of hot fusion"

- Julian Schwinger

20 Years of Experiments Later...

The products of "cold fusion" are not those of hot fusion

Weaknesses of Fusion Claim

1. Gamma rays missing or suppressed
2. Wrong neutron to tritium ratios
3. Wrong Helium-4 to neutron ratios
4. Missing 1st branch of TNF
5. Missing 2nd branch of TNF
6. Imprecise data for "24 MeV" energy
(wide range, incomplete assay)
7. Heavy Z transmutations
8. Normal water and hydrogen expts.

"Light" Water LENR

- Pons to Chuck Martin: "We're seeing heat in light water too! It's the most amazing thing"

A Priori dismissal?

- [REDACTED]: "I don't trust the light water work of Miley."
- [REDACTED]: "I don't trust the Piantelli calorimetry"

Fleischmann Knew

March 13, 1989 - Fleischmann:

- Tritium production too low
- Neutron production too low

"What on earth is going on?...I am so nervous."

April 10, 1989 - Fleischmann-Pons

"...or an hitherto unknown nuclear process or processes"

Not Fusion?

Martin Fleischmann:
"What else could it be?"

Nuclear Fission?

Nuclear Fusion?

Perhaps Like Christopher Columbus'
"Discovery of India"

Widom-Larsen Weak Interaction Claim (Strengths)

"Ultra-Low Momentum Neutron
Catalyzed Reactions"

- No Imaginary Physics Required
- Known Physics in a New Perspective
- Explains H as well as D Experiments
- Possibly Explains Transmutations

Widom-Larsen Weak Interaction Claim (Weaknesses)

1. **Difficult to understand:** Required skills:
QED, astrophysics/particle physics, condensed
matter physics, nuclear physics
2. **Withholding gamma suppression
mechanism**
3. **No experimental confirmations?**

So What?

What's the "So What"?

Possible Resolution

**Weak Interaction Models
May Resolve a 20-Year Science Dispute:**

The Scientific "Fiasco" of the Century

Scientific Process

Scientific Method:

"Theory is not as important as experiment"

Current Scientific Culture:

"Theory is very important"¹

The Future

Materials Science >

What are the nano-requirements?

Engineering >

How hot and how long?

Economic >

At what price?

The Future

When?

New Energy Times

www.newenergytimes.com

steven1@newenergytimes.com

EXTRA SLIDES

Myths of Weak Interactions

1. Limited to energetically weak energy release
2. Limited to low reaction rates

Not necessarily in LENR!

Neutron Catalyzed Reactions (Weak Interactions)

- Hideo Kozima
 - John Fisher
 - George Anderman
 - Lali Chatterjee
 - (Tadahiko Mizuno)
 - (Yasuhiro Iwamura)
 - (Stanislaw Szpak)
 - (Allan Widom - Lewis Larsen)
- (14 MeV per 4He atom)

2004 Dept. of Energy Review

- Oct. 2003 – “Cold Fusion” Review Proposed to DoE (no transmutation, no light hydrogen)
- March 2004 – DoE: Begins Review
- Dec. 2004 – DoE: “Cold Fusion” Still doesn’t look like real fusion – but something is going on

Dept. of Energy/Defense Meetings

- Feb. 20 2004 – DoE/EPRI: Lewis Larsen – Invited Talk (Theory, Excess Heat, Transmutations)
- Oct. 25-28, 2006 – DTRA/NRL Workshop: (20-30 participants)
- Dec. 12-13, 2006 – DTRA Meeting
Invited talks: Lewis Larsen, Mitch Swartz, Dave Nagel, Bob Park (100 participants)
- More DoE and DoD – Meetings, proposals...
(DTRA Sept. 5, 2007, Sharon Weinberger’s Wired Blog)