How to Load a Palladium Electrode, Past a Threshold, with Deuterium

Inspired by an article by Dr. Paul Wilhelm, Phd.

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Here's Paul's article:

Advanced Rediscovery

The Experiments Physics Trained Itself to Ignore

On March 23, 1989, two chemists stood in front of cameras in Salt Lake City and said a glass jar on their bench was making more heat than chemistry could explain. Not a reactor. Not a laser array. A jar of heavy water with a palladium rod in it...

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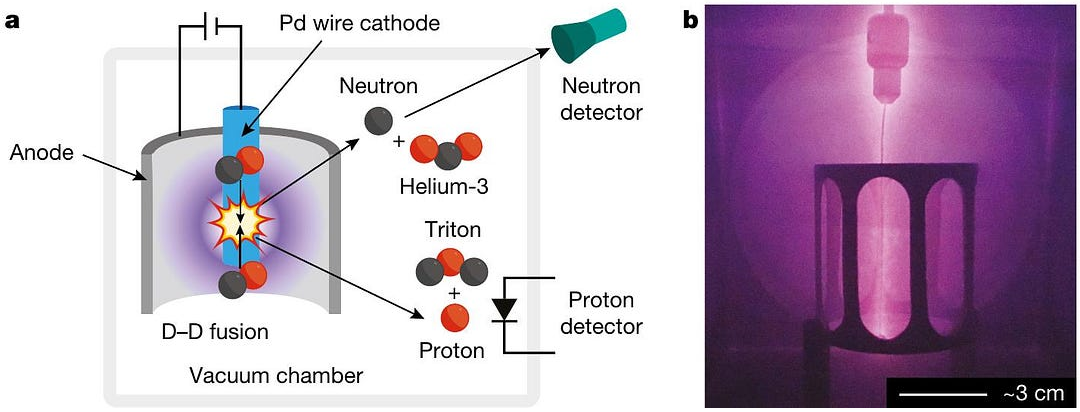
a day ago · 7 likes · 1 comment · Dr. Paul Wilhelm

I am sick of "seemingly" well-intentioned research scientists debunking this science by failing to continuously strive for success no matter how many failures they suffer from. They're lazy. It's easy to refuse to struggle with ignorance: just give up! » »



How to erroneously debunk cold fusion is to not replicate the entire experiment!

In the words of Eugene Mallove:

> One event described here which is not described in the technical literature is an extraordinary 10-day long heat-after-death incident that occurred in 1991. News of this appeared in the popular press, but a formal description was never published in a scientific paper. Mizuno says this is because he does not have carefully established calorimetric data to prove the event occurred, but I think he does not need it. The cell went out of control. Mizuno cooled it over 10 days by placing it in a large bucket of water. During this period, more than 37 liters of water evaporated from the bucket, which means the cell produced more than 84 megajoules of energy during this period alone, and 114 megajoules during the entire experiment. The only active material in the cell was 100 grams of palladium. It produced 27 times more energy than an equivalent mass of the best chemical fuel, gasoline, can produce. I think the 36 liters of evaporated water constitute better scientific evidence than the most carefully calibrated high precision instrument could produce. This is first-principle proof of heat. A bucket left by itself for 10 days in a university laboratory will not lose any measurable level of water to evaporation. First principle experiments are not fashionable. Many scientists nowadays will not look at a simple experiment in which 36 liters of water evaporate, but high tech instruments and computers

> are not used. They will dismiss this as “anecdotal evidence.” It is a terrible shame that Mizuno did not call in a dozen other scientists to see and feel the hot cell.

And:

> Perhaps cold fusion is self-evident in the way that many great discoveries are. An ordinary genius finds an obscure and difficult truth which remains obscure even after he publishes, except to other experts. A superlative genius makes a discovery that few other people imagined, yet which everyone later agrees is obvious in retrospect. When T. H. Huxley learned of the theory of natural selection, he reportedly exclaimed: “why didn’t I think of that!”

And:

> One of the few “Eureka!” events in this book is the moment when Mizuno and Ohmori saw the scanning electron microscope images of the beautiful lily-shaped eruptions on the surface of Ohmori’s gold cathodes. This was visual proof that a violent reaction takes place under the surface of the metal, vaporizing the metal and spewing it out. Later, these vaporized spots were found to be the locus of transmutation. Around them are gathered elements with an isotopic distribution that does not exist in nature. The only likely explanation is that these isotopes are the product of a nuclear transmutation.

Nuclear Transmutation The Reality Of Col...

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This is not a PDF copy of the book. This is simply a foreword by Dr. Eugene Mallove which remains worthwhile reading.

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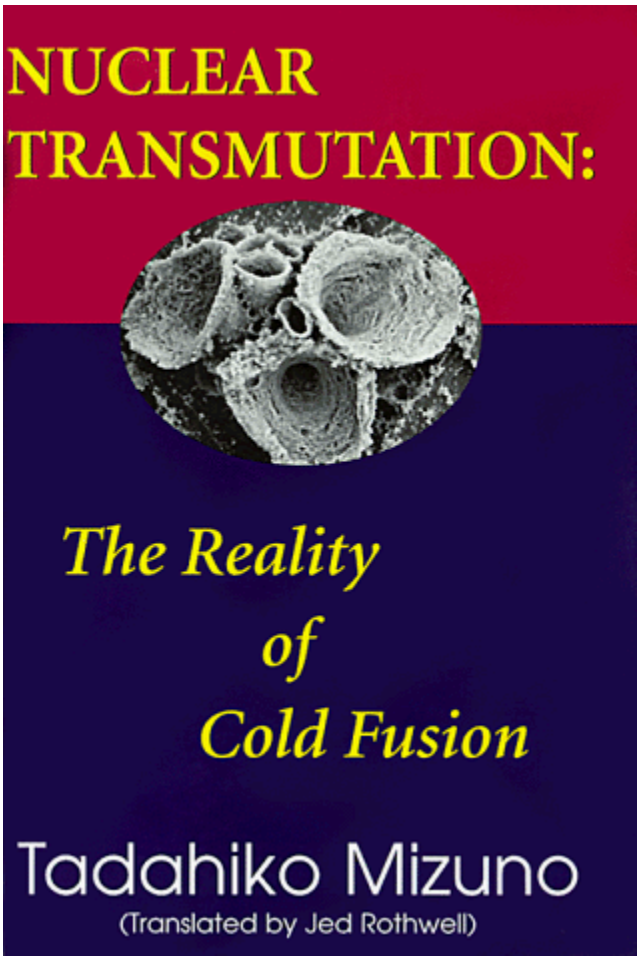

With a forward by Eugene Mallove!

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For further reading, see:

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Here is the second of two results from asking Bing Copilot AI the title question to this post (in the first result, I misspelled deutrium and I post that down-below):

Loading a Palladium Electrode Past a Threshold with Deuterium

To load a palladium (Pd) electrode past a deuterium (D) threshold — such as the ~0.85 D/Pd ratio often associated with excess heat effects — you must control both **electrochemical conditions** and **material integrity**.

1. Electrochemical Interface and Current Density

High D/Pd loading requires a **high deuterium activity** at the electrochemical interface. This is achieved by:

- **Sustained high current density** during electrolysis in D_2O + LiOD or similar electrolyte. [1] [2]
- Using **pulsed electrolysis** (e.g., high peak current, short pulse width) to rapidly drive deuterium into the lattice. [3]
- Maintaining **low overvoltage** to avoid surface passivation, which can block further uptake.

2. Material Condition and Defect Density

The bulk Pd must be able to **withstand and contain high D activities** without cracking or delamination:

- **Cold-worked or textured Pd** can enhance loading capacity. [3]
- **Surface oxidation** (e.g., mild oxidation before electrolysis) has been shown to improve absorption rates and sometimes trigger excess heat. [3]
- Avoid surface defects, cracks, or inclusions that can act as deloading sites. [2]
- Metallurgical characterization (grain size, hardness, grain boundary structure) correlates with loading capacity and excess heat production. [1]

3. Loading Modes and Threshold Crossing

McKubre's work identifies three loading modes: [1]

- **Mode A**: Linear resistance drop with log-increase in current — favorable for high loading.
- **Mode B**: Initial drop, then rapid resistance rise — indicates mechanical disruption.
- **Mode C**: Shallow resistance drop — poor loading.

To cross the threshold, aim for **Mode A** behavior, ensuring the electrode remains mechanically sound.

4. Threshold and Excess Heat

- Excess heat effects are often reported above **D/Pd ≈ 0.85**. [2]
- Even high loading is not sufficient for measurable excess heat; **homogeneous soundness** in both surface and bulk is critical. [3]

- Calorimetry should be sensitive enough to detect the initial exothermic loading phase. [2]

5. Practical Steps

1. **Prepare electrode**: Use high-purity, defect-free Pd (e.g., cold-worked foil or plate).
2. **Surface treatment**: Optional mild oxidation to improve absorption.
3. **Electrolysis setup**: Constant or pulsed current in D_2O + LiOD, with temperature control and cooling to manage heat.
4. **Monitor**: Track D/Pd ratio (via weight gain or calorimetry) and resistance changes.
5. **Maintain**: Keep current density high enough to drive D into the lattice, but avoid mechanical stress that could trigger Mode B/C.

In summary: To load Pd past the deuterium threshold, combine high current/pulse electrolysis with a defect-free, well-conditioned electrode, monitor for Mode A loading behavior, and ensure mechanical integrity to sustain high D/Pd ratios. [1] [3]

Here is the first, misspelled result:

Loading a Palladium Electrode Past a Threshold with Deuterium

To load a palladium (Pd) electrode with deuterium (D_2) past a critical threshold — the point where high D/Pd ratios are achieved — you need to combine **high electrochemical activity at the surface** with **mechanical integrity in the bulk**.

1. Surface Preparation

- **Oxidation treatment**: Controlled surface oxidation can enhance deuterium absorption rates and create favorable electrochemical conditions for high loading. [1] [3]
- **Defect engineering**: Introduce controlled defects (e.g., via cold working or alloying) to provide lattice sites for deuterium trapping. [1]
- **Cleanliness**: Remove oxides and contaminants before loading to ensure maximum deuterium uptake.

2. Electrochemical Loading Technique

- **Pulsed electrolysis**: High peak currents (e.g., ~15 A) with short pulse widths (1 µs) have been shown to reach D/Pd ratios near 1 or higher. [3]
- **Current density**: Sustain high current densities to maintain high deuterium activity; excess heat is often linked to homogeneous, sustained loading. [1]
- **Electrolyte**: Use deuterium-enriched electrolyte (e.g., D_2O) and maintain good electrical contact between the Pd cathode and anode (e.g., Pt wire inside the Pd plate). [3]

3. Monitoring and Threshold Detection

- **Resistance change**: As D/Pd increases, Pd resistance typically decreases. A “resistance maximum” can indicate the threshold; beyond it, further loading may require higher current or pulse parameters. [1]
- **Calorimetry**: Measure heat output; excess heat often correlates with high D/Pd activity. [1] [3]
- **Coulometric assay**: Quantify deuterium uptake to track progress toward the threshold. [1]

4. Mechanical and Metallurgical Considerations

- **Defect density**: Higher defect density can help contain high deuterium pressures in incipient voids. [1]
- **Grain structure**: Smaller grain sizes and controlled grain boundaries can improve loading uniformity. [1]
- **Hardness**: Higher hardness can resist lattice damage from high deuterium pressures. [1]

5. Practical Steps

1. Prepare Pd electrode with oxidation and defect engineering.
2. Set up pulsed electrolysis cell with D_2O electrolyte and cooling to manage heat.
3. Apply high current pulses and monitor resistance/heat output.
4. Adjust pulse parameters if resistance plateaus or heat output plateaus — increase current or pulse energy to push past the threshold.
5. Verify D/Pd ratio with coulometric or calorimetric methods.

Tip: Once past the threshold, maintaining high D/Pd requires continuous high current density and stable surface conditions to avoid Mode B or C loading behavior, which indicate mechanical disruption or poor loading. [1]

This approach combines **electrochemical optimization** with **material engineering** to reliably load Pd past the deuterium threshold for high D/Pd activity.

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1 Materials Issues of Loading Deuterium Into Palladium and the Association with Excess Heat Production

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