

# Self-Polarisation of Fusion Diodes: Nuclear Energy or Chemical Artefact?

**F. David & J. Giles**

*Deuo Dynamics, Moss Side House, East Blairdaff, Aberdeenshire, AB51 5LT.  
(UK)*

E-mail: davidfa@altern.com

**Abstract.** The authors discuss the results of the testing of a new fusion device : the “Fusion Diode”.

The cold fusion community has been trying to justify cold fusion on the basis of empirically produced excess heat for nearly two decades. [1], [2] The science world has continually resisted the possibility, citing the heat as not conclusive. Some problems of chemical reactions can interfere with calorimetry. [3]

The authors have sought a different approach, whereby the device has no input energy, relying on the only energy produced from the device. We are using diodes, made of palladium as the metal, and silicon as the semiconductor. We have also tried other semiconductors. But we describe here our experiments with silicon. The palladium is loaded with deuterium simply by the gas-loading method. We don't know the effective loading value, but it is probably rather high, because of the micrometer size of the palladium powder.

A diode is basically a surface of contact with a metal (electronic conductor) and a semiconductor (hole conductor).

We think that the deuterium nuclei which are in the palladium will be driven in the direction of the electric field. Once these deuterium cores will arrive at the interface between palladium and the semiconductor, they will accumulate there. The probability of fusion probably will increase. [4]

Better: if reactions of fusion take place into the junction, an excitation of the electrons will occur at this level (as in the junction zone of a photovoltaic cell). A solar cell is a diode with a large surface. When photons fall on the junction zone, certain atoms are excited, and electrons pass from a low energy level to a higher energy level. A spontaneous electric voltage thus will appear. It is what we observed.

In order to get a surface of junction as large as possible, our fusion diodes are made as powder diodes, with a large surface junction made up of a semiconductor powder in contact with palladium powder charged with deuterium. (Fig. 1) [5] The weight of palladium powder is comprised between 1 g and 2 g by diode.

The suspected fusion reactions take place in the junction between the semiconductor and the Palladium powder, which produces an excitation which is transmitted to the electrons. This excitation increases their energy and allows them to cross the bandgap of the semiconductor and pass into the conduction band, as in a photovoltaic cell. This energy very quickly appears as a spontaneous potential difference which can reach over 0.5 volt per junction. (open circuit)

Diodes comprising of a stack of junctions were made, making it possible to obtain over 1 volt at the poles of a very compact device of a few centimeters length. The released power remains very low for the moment, (in the nanowatt range) but it should be noted that it is presented in the form of directly usable electrical energy, and not of thermal energy.

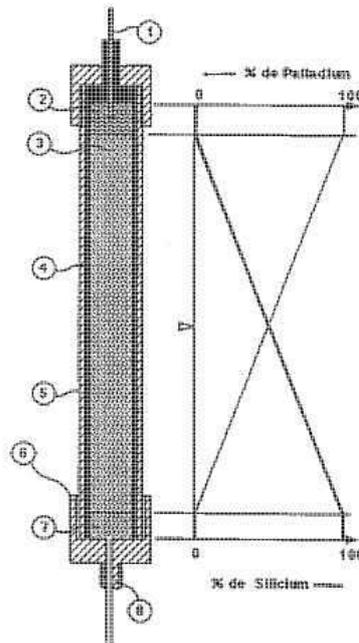


Fig. 1 - Our fusion diode : 1 Electrical connection; 2 End cap with threading; 3 Mix of silicon and palladium powder (at the bottom pure palladium and then an increasing concentration of silicon; at the middle of the diode: 50% silicon, 50% palladium; at the top: pure silicon. The result is a very large surface rectifier diode); 4 Plastic tube for insulation; 5 Aluminum or machined nylon container; 7 End cap; 8 Swagelok valve.

Of course, we have made blank and control experiments. We have built three diodes, one filled with pure deuterium (1.5 bar) another filled with hydrogen at the same pressure, and another filled with pure argon (Fig. 2). The black plastic tubes are 6 cm long.

We observed no voltage with argon filling, a little voltage with hydrogen, twice the voltage with deuterium. We think that the observed voltage with hydrogen is generated by the little amount of deuterium in the hydrogen. (0.015%)



Fig. 2 - Three diodes, one filled with pure deuterium (1.5 bar) another filled with hydrogen at the same pressure, and another filled with pure argon.

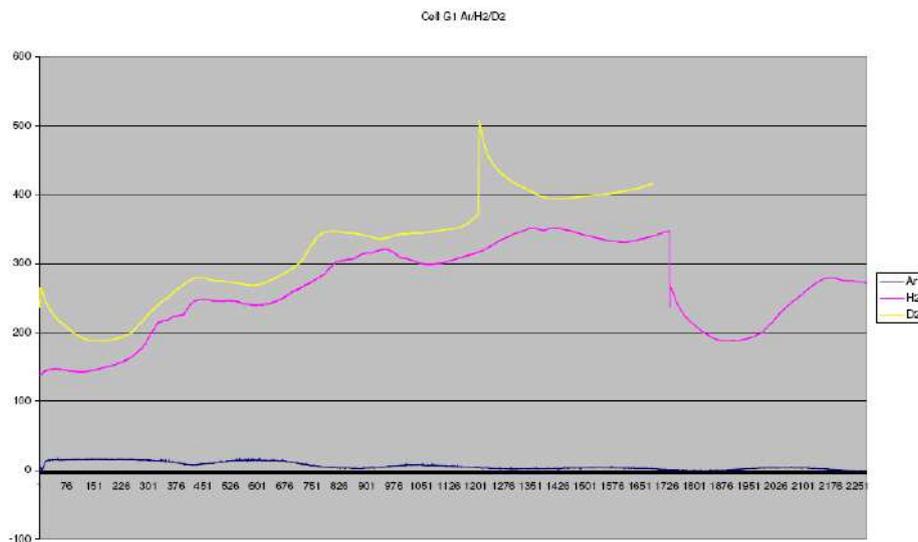


Fig. 3 - Yellow line : voltage at the ends of the deuterium filled diode; Cyan Line : voltage at the ends of the hydrogen filled diode; Blue line : voltage at the ends of the argon filled diode. Vertical axis: millivolts; Horizontal axis: minutes.

Our lab is not air-conditioned : the diurnal oscillation of the voltage is probably caused by the variation of the temperature of our lab, so we can exclude a “Allais Effect”.

Is the observed release of energy due to the fusion of the deuterium nuclei, or is it an electrical voltage produced by an electrochemical reaction? (For example, oxidation of deuterium by the little amount of adsorbed oxygen on the powder) The authors plan to prove the origin of the energy measured over several months with the help of various methods. First of all, we plan to seal our fusion diodes inside glass containers, to avoid leak of deuterium.

## References

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