Effetti termici anomali in fili sottili di Costantana ed interazione con Idrogeno

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Low Energy Nuclear Reactions

Univ. Roma 1-La Sapienza, Dep. Engineering; July 15, 2013, Rome

***CIRPS**: Centro Interuniversitario di Ricerca per lo Sviluppo Sostenibile*

OUTLINE

a) ICCF17 (selected parts) =>suggestions/critics=> long time blanks with nominally inert Pt wires instead of, potentially "active", Constantan. Two very similar glass reactors and slightly different mica supports.

b) Experiments with two Constantan (type 2L, 400L) wires at the same time, instead of previous Ni-Cr (reference) and Constantan (700L).

c) The water splitting effect on 2L Constantan (***supposed*** covered by, very hydroscopic, "nano-diamandoids").

d) Four experiments (3 Constantan, 1 Pt) performed under "dynamic vacuum" procedures to avoid influence of gas pressure (since February 2013).

e) One of the key results obtained by MFMP group: demonstration (June 26, 2013), by dynamic vacuum measurements, of Hydrogen concentration threshold (by R/Ro) measurements) for *Anomalous Heat Effect* generation at high temperatures.

Main results/comments on Pt wires measurements

a) Were used 2 wires, l=100cm: a) made by assembling, in parallel, 4 wires with Φ= 50μm (almost equivalent to 200μm, called Active); b) with a single wire of Φ=100μm (called Monitor). i.e., similar resistances.

b) The behavior of local wire temperatures, changing the power applied, were as expected changing the wire diameters: higher temperatures on thinner wires.

c) The behavior of local wire temperatures , changing the gas used (H2, He, Vacuum), were as expected: higher temperatures into less conducting gas, i.e. vacuum (thermal conduction, apart local contacts with mica supports, mainly by irradiation).

d) The effects on temperatures internal and external (used to calculate the anomalous excess power), if any, were as expected changing the pressures. I.E. reducing the pressure, under He, the internal chamber temperature increased and the external decreased. *Such result is the reply, fully experimental, to main critics on our previous experiments (June-December 2012) with Constantan and Hydrogen: in such specific conditions BOTH internal and external temperatures increased reducing H_2 pressures.* As a simple consequence, the experiments were right.

Recenti risultati con fili di Costantana, superficie multistrato sub-micrometrica.

A) Dal 13 Dicembre 2012 utilizzata una nuova configurazione in cui i fili, sempre due (lunghezza 100 cm, diametro di circa 200 micron), erano entrambi di Costantana. Precedentemente (Giugno-Dicembre 2012) uno era di Ni-Cr, l'altro di Costantana sub-micrometrica.

B) Filo di Monitor: Costantana con 2 soli strati di materiale sub-micrometrico, cosiddetto "nano-diamandoidi". Spessore addizionale <100nm.

C) Filo Attivo: Costantana con 360 strati, diametro apparente medio aumentato da 200 micron a circa 220 micron (misure con micrometro e SEM).

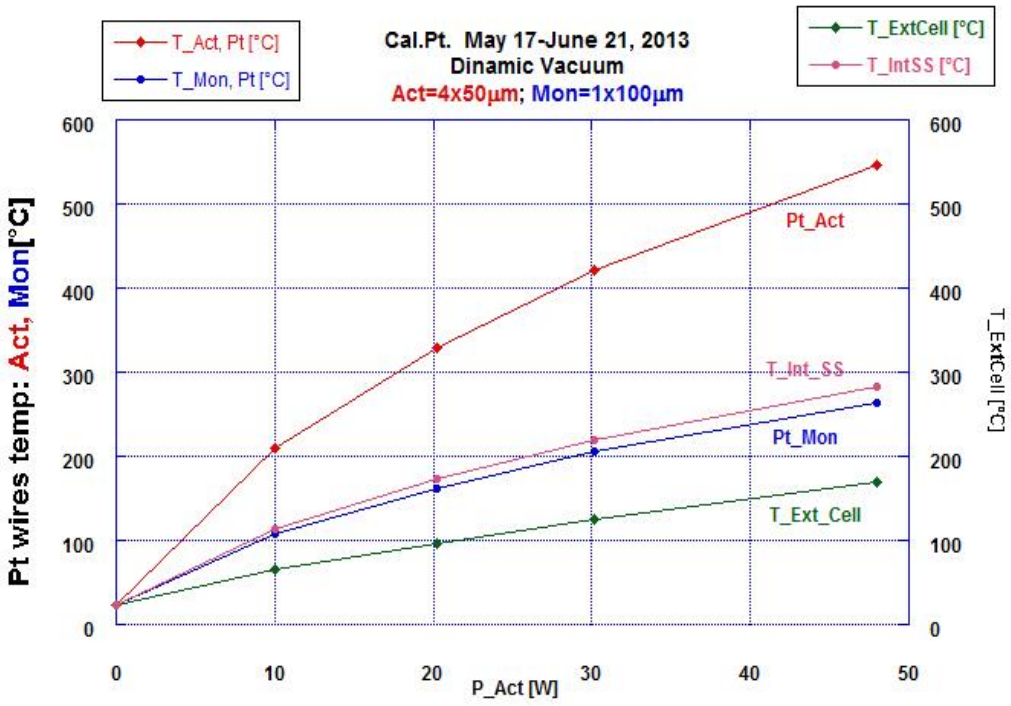
D) Motivazione della sostituzione del Ni-Cr (nominalmente inerte dal punto di vista della generazione di anomalie termiche, almeno nelle condizioni utilizzate) era stata la improvvisa non-disponibilità del Ni-Cr in Laboratorio (INFN-LNF) nel momento del montaggio del nuovo reattore (esperimento #3). Sono stato quindi costretto ad utilizzare un filo di costantana con superficie, per quanto possibile, "vergine".

E) Poiché la specifica preparazione del filo di Costantana utilizzato (ISOTAN 44, Società Tedesca Isabellenhutte) comportava la "distruzione esplosiva" della specifica plastica utilizzata dalla Isabellenhutte per la protezione del filo stesso da inquinanti atmosferici, mi sono reso conto che la superficie poteva essere ricoperta perfino di Carbonio a dimensioni nanometriche. Caratteristica saliente: isolante in superficie, estremamente duro. Lunghe speculazioni scientifiche (Prof. Giorgio Vassallo, Univ. Palermo; Dr Angelo Ovidi, Soc. Kresenn, UK) hanno portato ad *IPOTIZZARE* che la superficie potesse essere ricoperta di *nano-diamandoidi (Carbonio ed Idrogeno).*

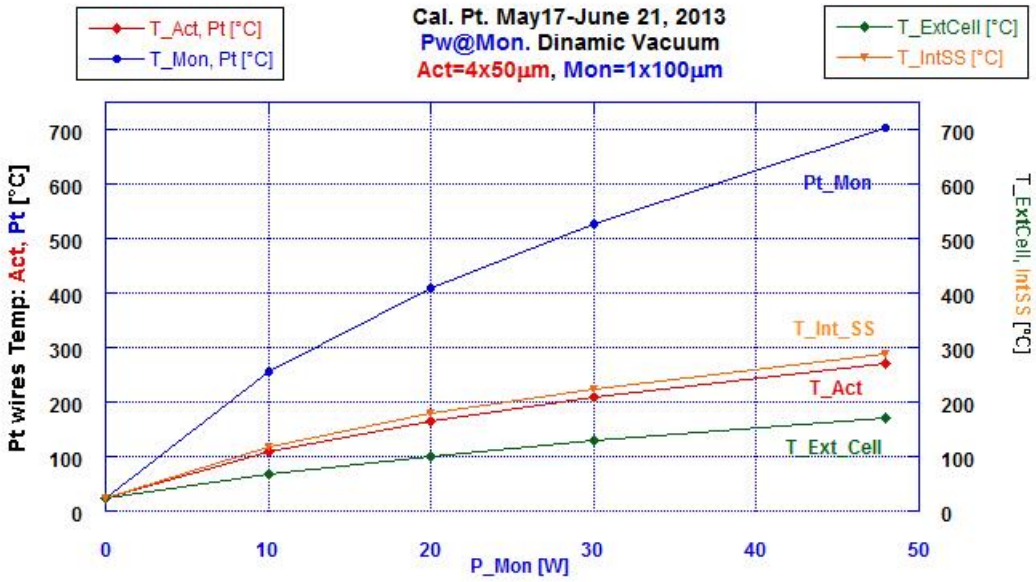
F) Misure successive con SEM e soprattutto evidenza di adsorbimento superficiale di acqua, molto stabile, sembrano confermare l'ipotesi dei nano-diamandoidi.

G) Ulteriori analisi con microscopio ad Effetto Tunnel e TEM sono indispensabili per suffragare l'ipotesi geometrico-composizionale dei nano-diamandoidi.

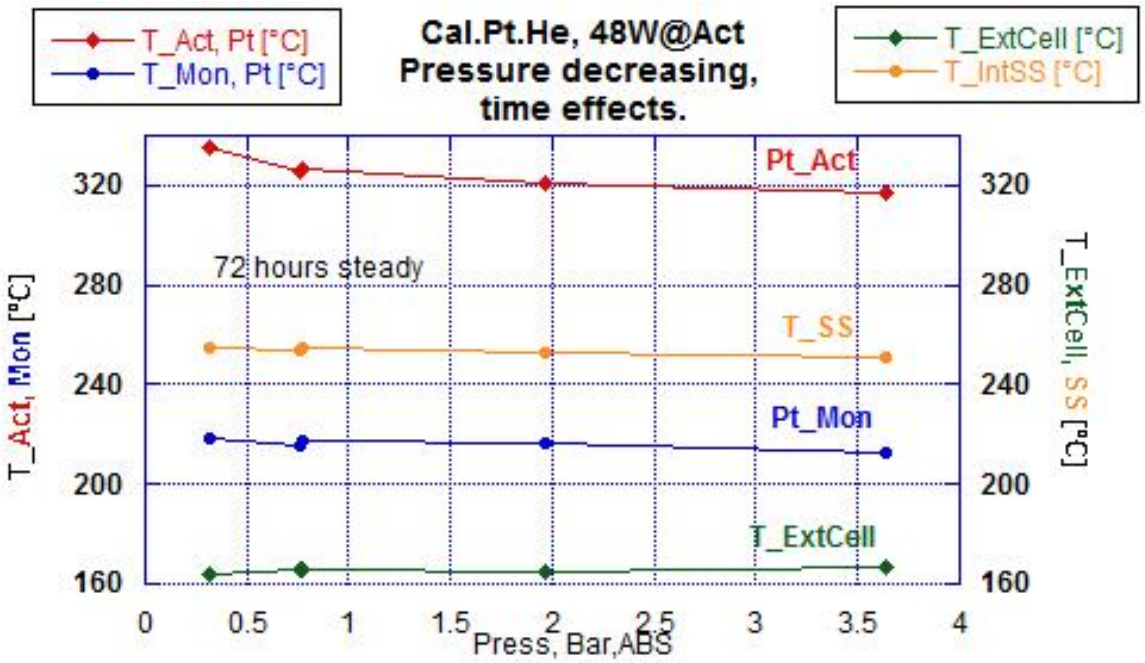
H) Le inattese misure sperimentali di apparente water-splitting della (piccola) quantità di acqua assorbita sulla superficie del filo sembrano aver aperto un nuovo sub-filone di attività sulle LENR utilizzanti tal fili particolarmente resistenti dal punto di vista meccanico. Ad esempio, il gruppo di lavoro coordinato da *Ubaldo Mastromatteo* (STMicroelectronics, Milano) utilizza preferibilmente tale tipologia di filo.



Pt wire, Pw applied to Act wire. Measurement of mean Pt wire temperature by resistive thermal coefficient values. Cross-ceck by visual observation, color, at higher powers: only limited wire sections start light-red colors.



Pt wire, Pw applied to Mon wire. Measurement of mean Pt wire temperature by resistive thermal coefficient values. Cross-ceck by visual observation, color, at higher powers: starts red color almost uniform.

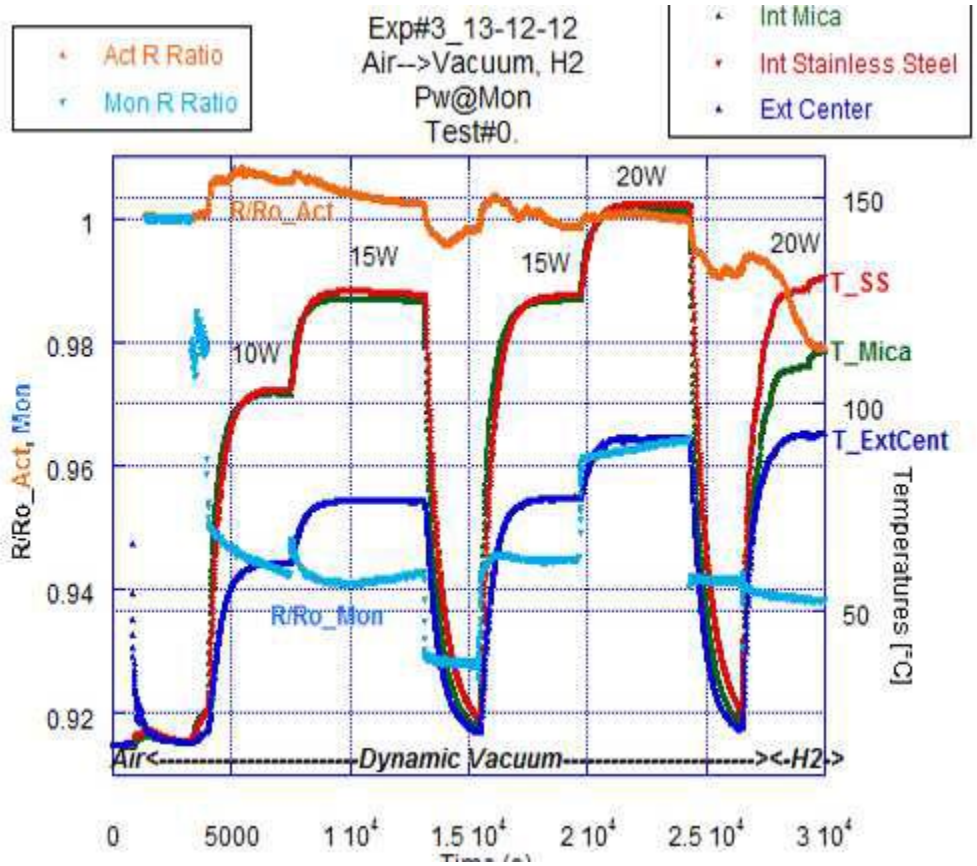


Pw at Pt_Act., 48W. He atmosphere. Effect of pressure variation on Pt_Act and Pt_Mon. temperatures: they increase as the pressure decreases. Also The internal cell temperature (T_SS) increases. Only the External Cell (ExtCell) temperature (green color) decreases.

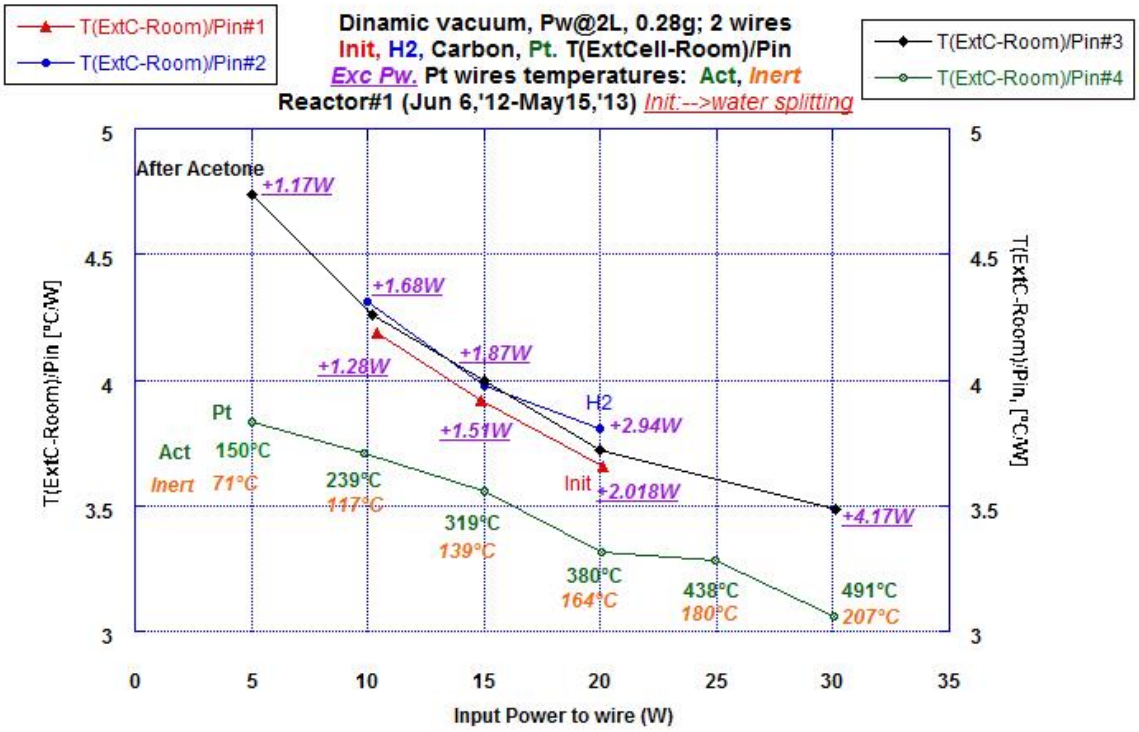
Such value is used to evaluate the power produced inside the cell, both by the Stefan-Boltzmann low (proportional to T^4) and by linear calculation:

(T_extCell-T_Room)/P_in [°C/W].

Both the calculations method adopted gave similar results.



First experiment with 2 Constant wires, one with 2 layers (pale blue color) , the second with 360Layers (brown color).
Observation of possible water splitting phenomena during vacuum degassing of the reactor and power applied at 2L wire.
The temperature of phenomena started at about 240°C.
A possible processes step can be:
$2xH_2O \rightarrow 2H_2+O_2$;
$H_2 \rightarrow 2H$
Absorption of H inside Constantan lattice.
The H absorption is inferred by resistance decreasing of 2L constantan (-6%), stable even coming back to room temperature.



Dynamic vacuum measurements. Reactor #1 (June 2012; May 15, 2013).

Used linear relationship between temperatures differences (T_External Cell-T_Room) over the input powers [°C/W].

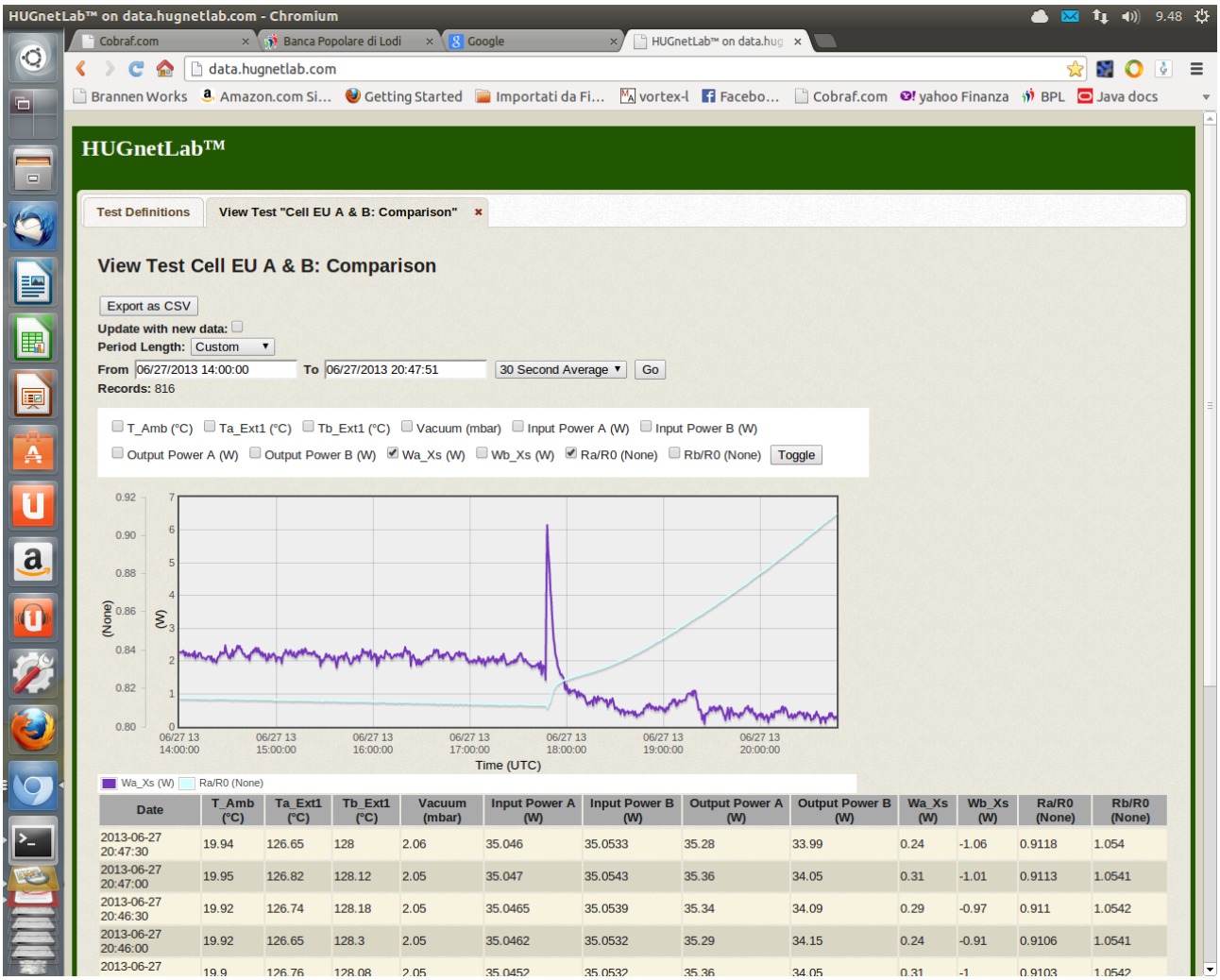
Cross-calibrations using Pt wire (4x50μm in parallel, called Act) of the same diameter of Constantan wire (200μm).

It is supposed that the values of °C/W of Platinum is the reference value, i.e. zero excess power. Excess power in violet color.

Are reported behaviours of Constantan wire type 2 layers (so-called nano-diamondoids type).

Init is after "water splitting" event; H_2 is after several loading cycles with H_2; Acetone is after injection of small amount of acetone inside the cell and subsequent high temperature decomposition (followed by vacuum→ H2→ vacuum cycles).

The anomalous power increases at higher local wire temperatures.



Date	T_Amb (°C)	Ta_Ext1 (°C)	Tb_Ext1 (°C)	Vacuum (mbar)	Input Power A (W)	Input Power B (W)	Output Power A (W)	Output Power B (W)	Wa_Xs (W)	Wb_Xs (W)	Ra/R0 (None)	Rb/R0 (None)
2013-06-27 20:47:30	19.94	126.65	128	2.06	35.046	35.0533	35.28	33.99	0.24	-1.06	0.9118	1.054
2013-06-27 20:47:00	19.95	126.82	128.12	2.05	35.047	35.0543	35.36	34.05	0.31	-1.01	0.9113	1.0541
2013-06-27 20:46:30	19.92	126.74	128.18	2.05	35.0465	35.0539	35.34	34.09	0.29	-0.97	0.911	1.0542
2013-06-27 20:46:00	19.92	126.65	128.3	2.05	35.0462	35.0532	35.29	34.15	0.24	-0.91	0.9106	1.0541
2013-06-27	19.9	126.76	128.08	2.05	35.0452	35.0532	35.36	34.05	0.31	-1	0.9103	1.0542

Experiment performed by the "Martin Fleischmann Memorial Project" collaboration.

Dynamic vacuum, indirect heating, temperature about 200°C.

It is clearly shown that Anomalous Excess Heat, over 2W, vanish after the resistance ratio of the Constant wire was larger than 0.81.

Latest News

July 10, 2013, Prof. Akito Takahshi, Akira Kitamura (and Collaborators), joint collaboration between Kobe University and Technova Company (Japan) announced that they got Anomalous Heat Excess, for long time (days) using nano-powder of Ni-Cu (80/20), embedded in a mesoporous silica.

The anomalous heat was about 15W at a temperature as large as 300°C. The input power to keep the system warm was 120W. They used flow calorimetry with diathermic oil. Cross calibrations were made both by inert material (alumina) and Joule heating of the reactor. The excess power density is of the order of 4W/g in respect to Ni content.

Further details will be given during incoming ICCF18 (USA).

CONCLUSIONS

- **The large family of Constantan materials (low cost alloy of Ni and Cu), seems to be a good candidate to generate Anomalous Heat Effects after proper interaction with Hydrogen even at high temperatures (200-600°C).**

- **The effect is magnified if the material is at sub-micrometric dimensions.**

- **Thanks to long calibrations using Pt wires, the supposed errors in the interpretation of data due to Hydrogen pressure reduction in the INFN-LNF experiments of June 2012-December 2012 are completely ruled out.**

- **The calibrations show that was an UNDER-EXSTIMATION of Anomalous Excess Heat, NOT OVER-EXSTIMATION.**