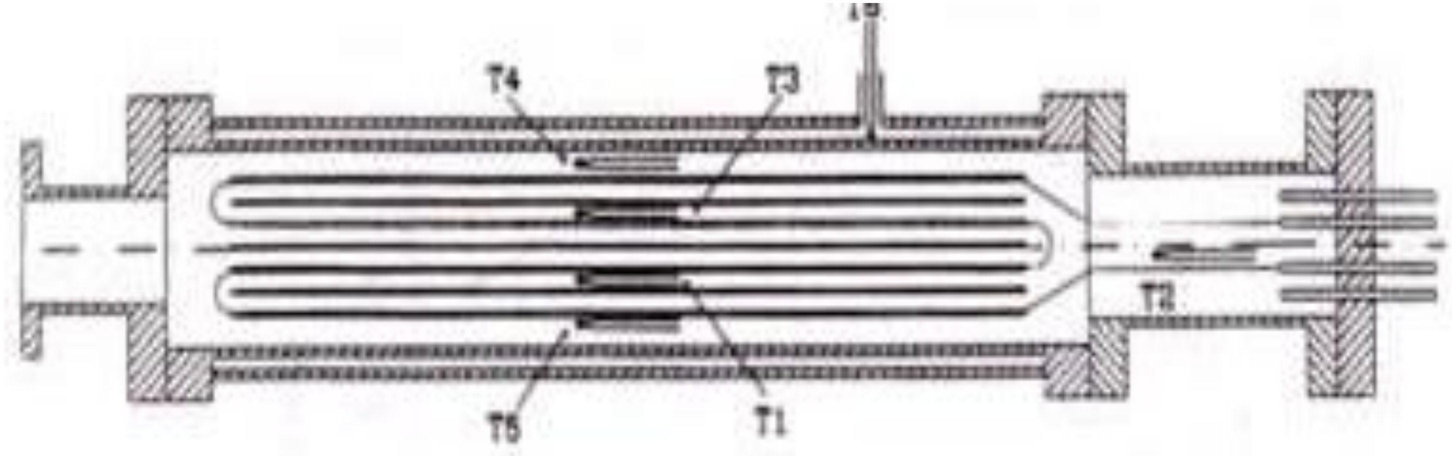
The International Society for Condensed Matter Nuclear Science.

10th International Workshop on Anomalies in Hydrogen Loaded Metals

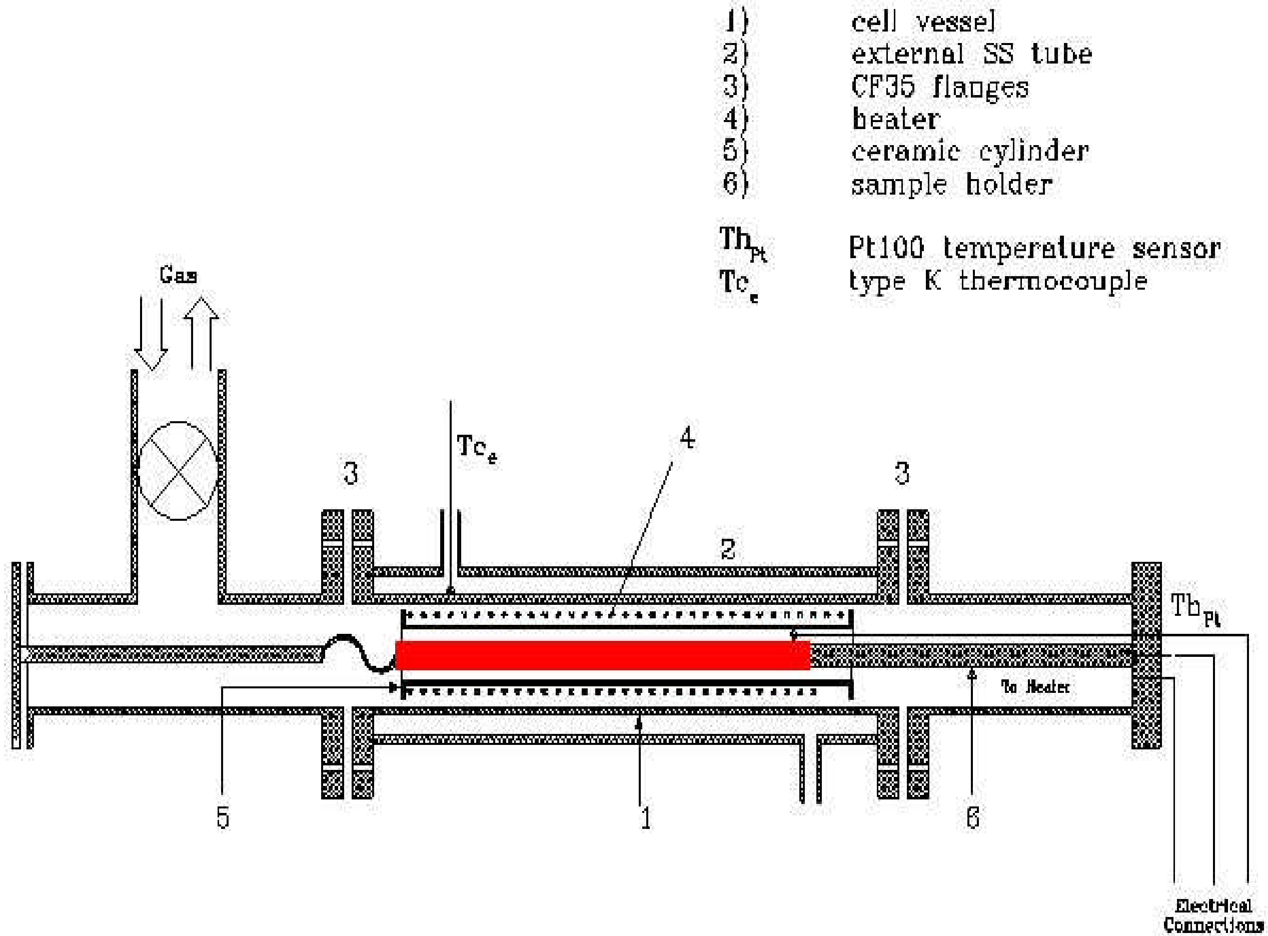
10-14 April 2012

Certosa di Pontignano, Loc. Pontignano, 53010 Vagliagli, Siena - Italia

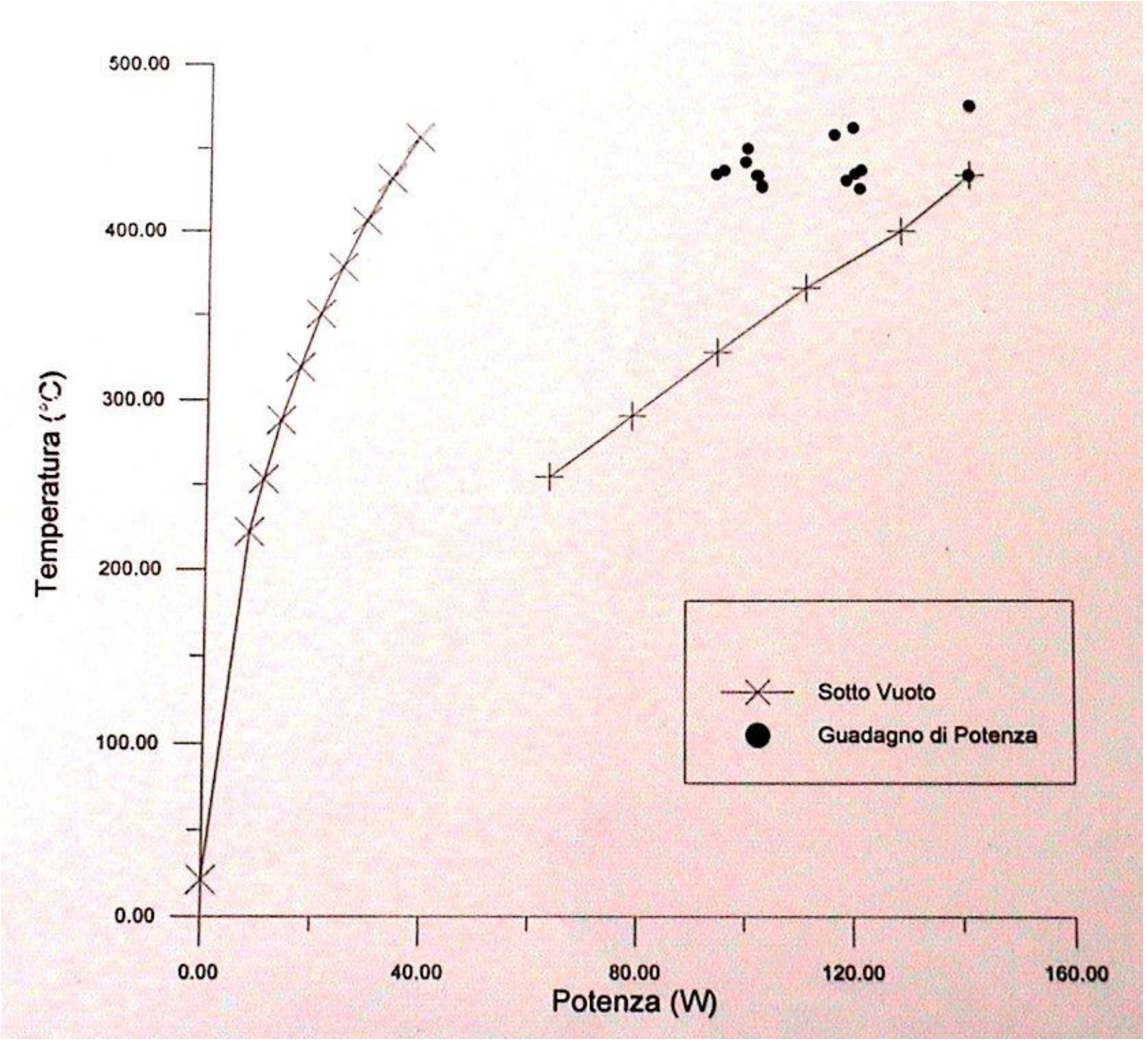
F. Piantelli, W. Collis

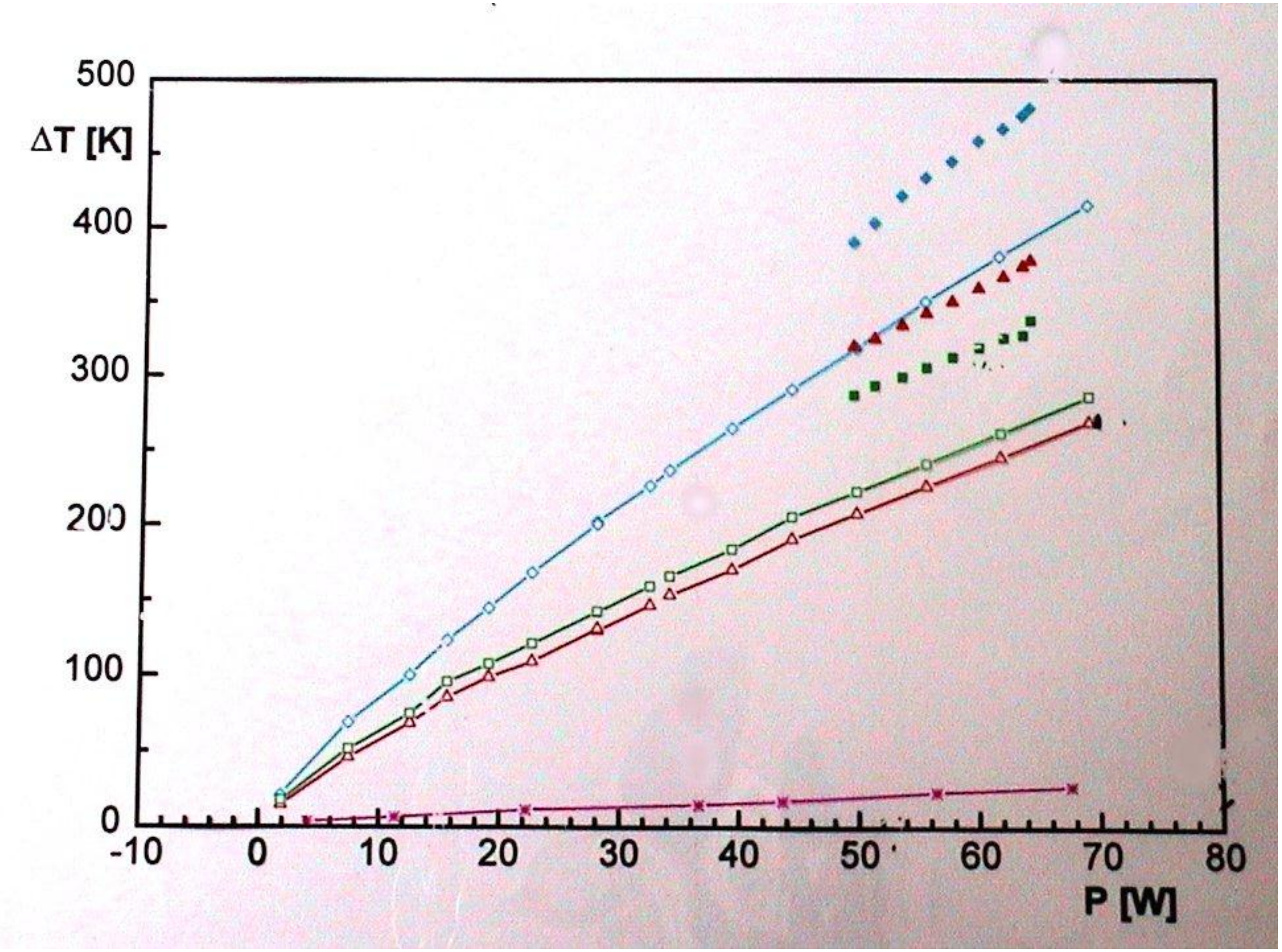


Cell for three planar samples

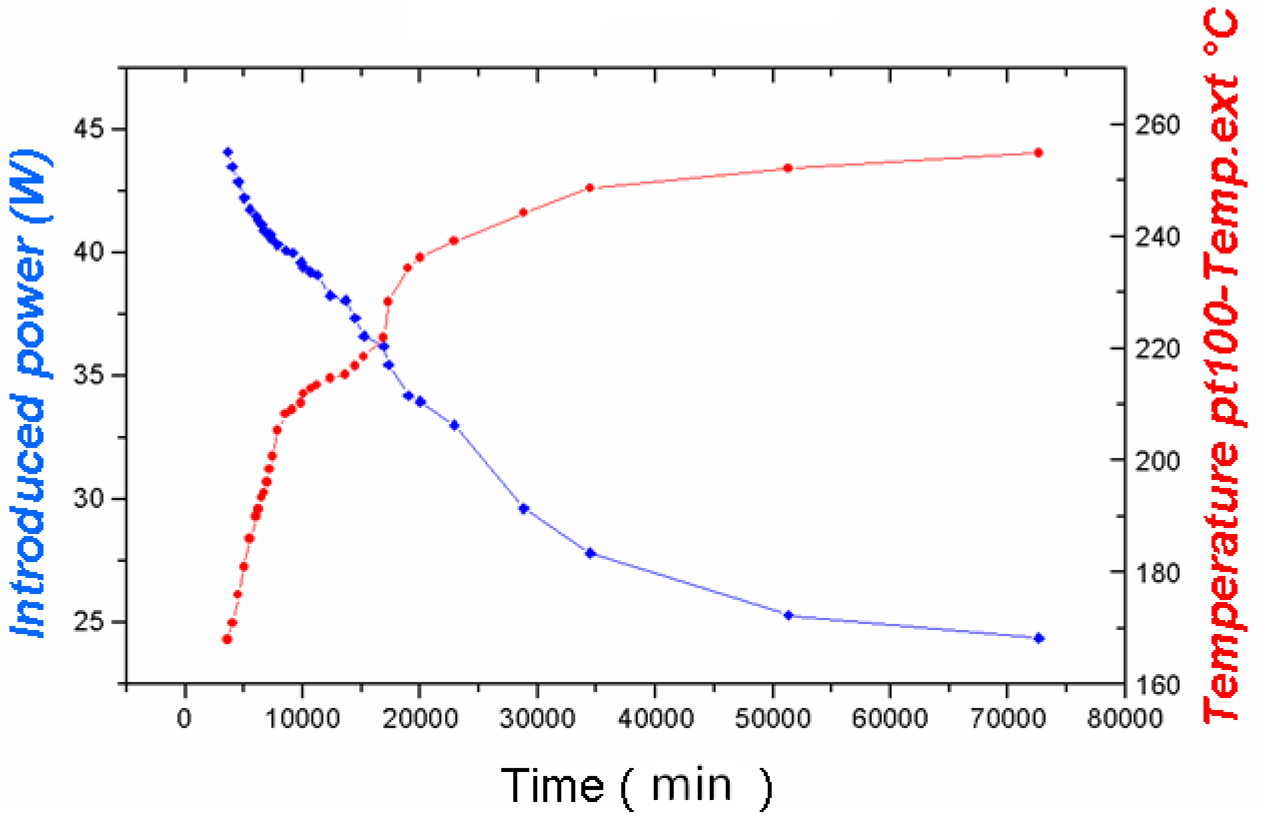


Cell for a cylindrical sample


500.00
400.00
300.00
200.00
100.00
0.00
Temperatura (°C)
0.00
40.00
80.00
120.00
160.00
Potenza (W)
Sotto Vuoto
Guadagno di Potenza



500
ΔT [K]
400
300
200
100
0
-10
0
10
20
30
40
50
60
70
80
P [W]


Introduced power (W)
Temperature pt100-Temp.ext °C
Time (min)
45
40
35
30
25
260
240
220
200
180
160
0
10000
20000
30000
40000
50000
60000
70000
80000

Experiment performed at Nuclear and Theoretic Physics Depart. of Pavia

Repetition of one exsperiment performed at Physics Depart. Of Siena

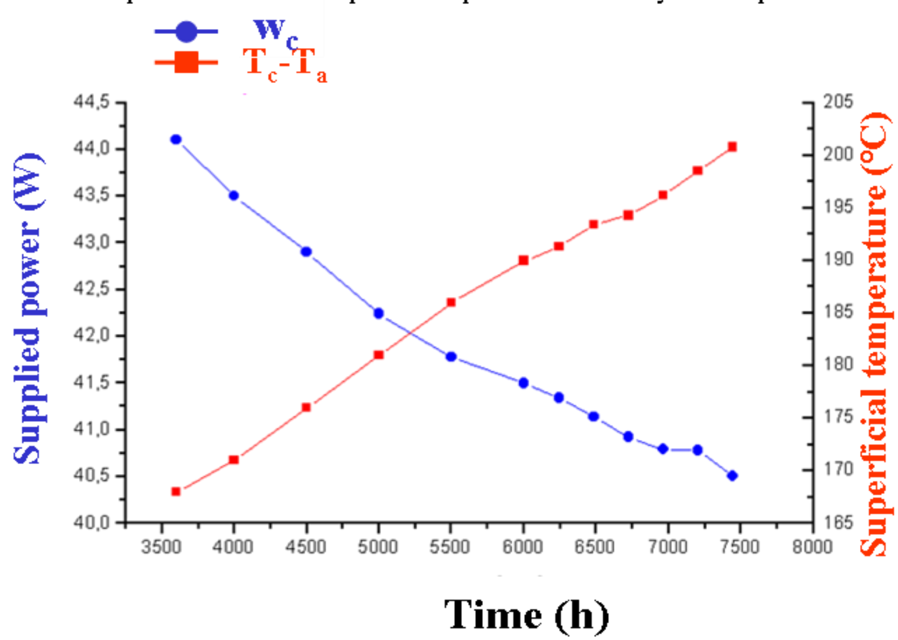


Fig 1b)

Fig. 1: Monitoring of the energy production:

a) curve as a function of the supplied power (blue);temperature curve after energy production starting (red)

b) energy production process: temperature (red) and supplied power (blue) as a function of time. When the temperature increases, because of the energy production phenomenon, there is a decrease of the provided power due to the growth of Pt heater resistance supplied by constant continuous voltage.

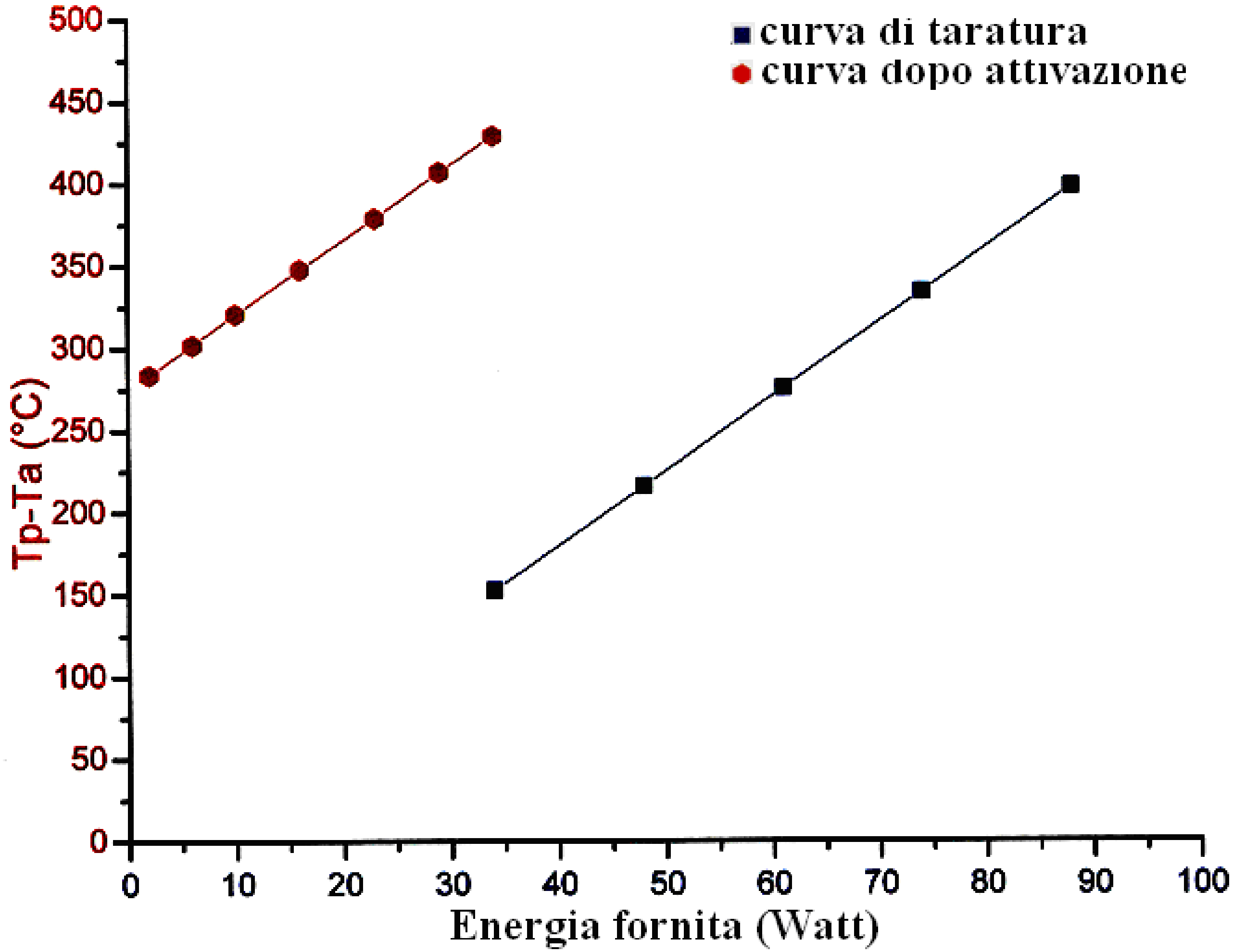
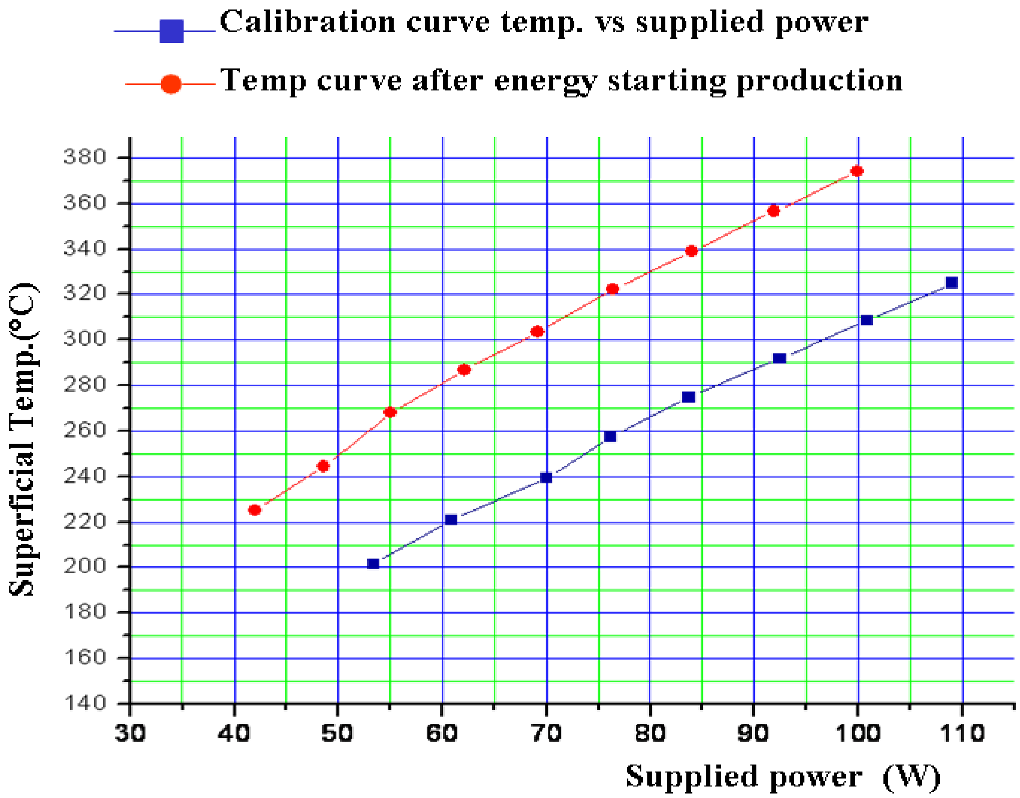
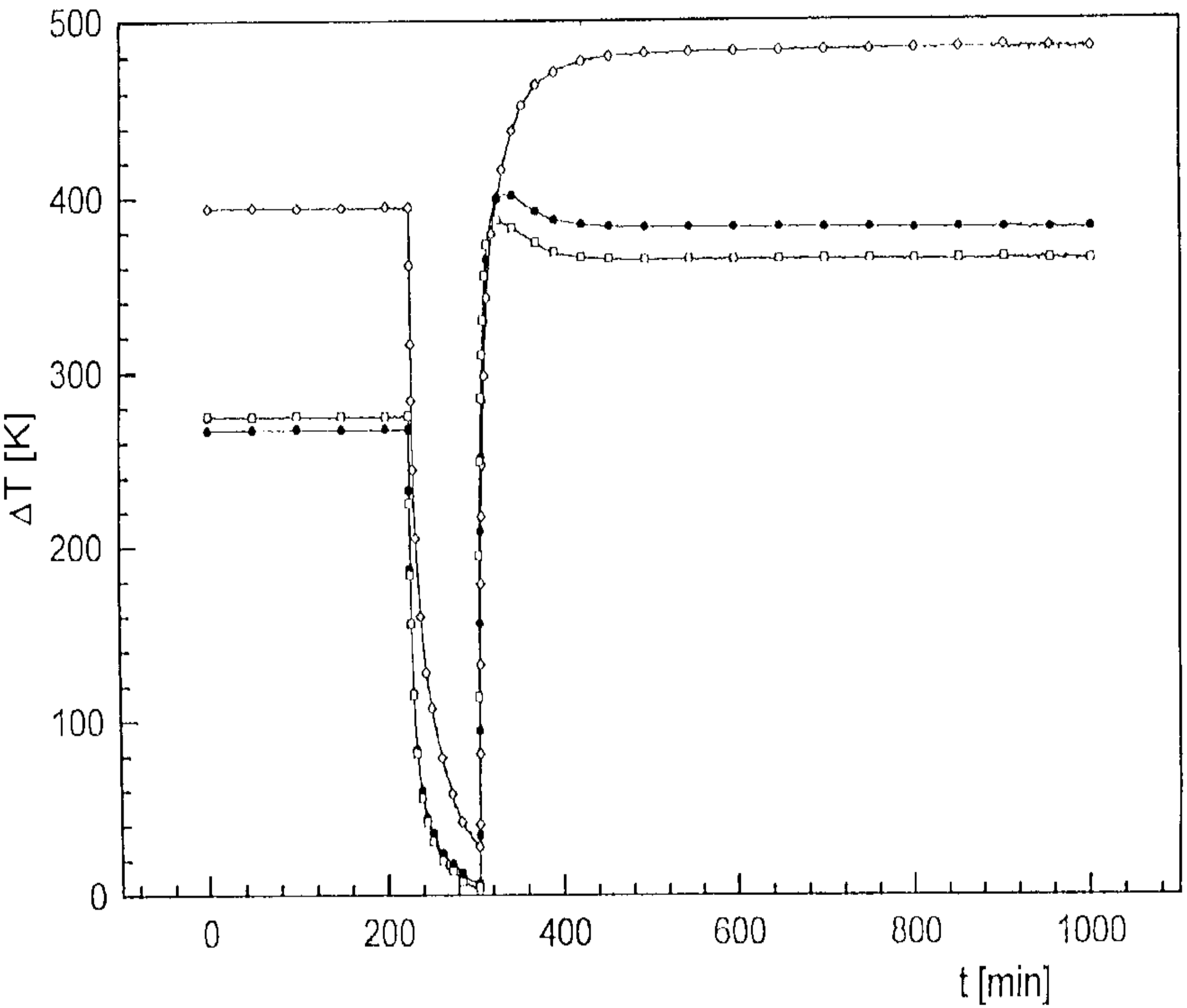


Figura 7b: taratura e produzione di energia

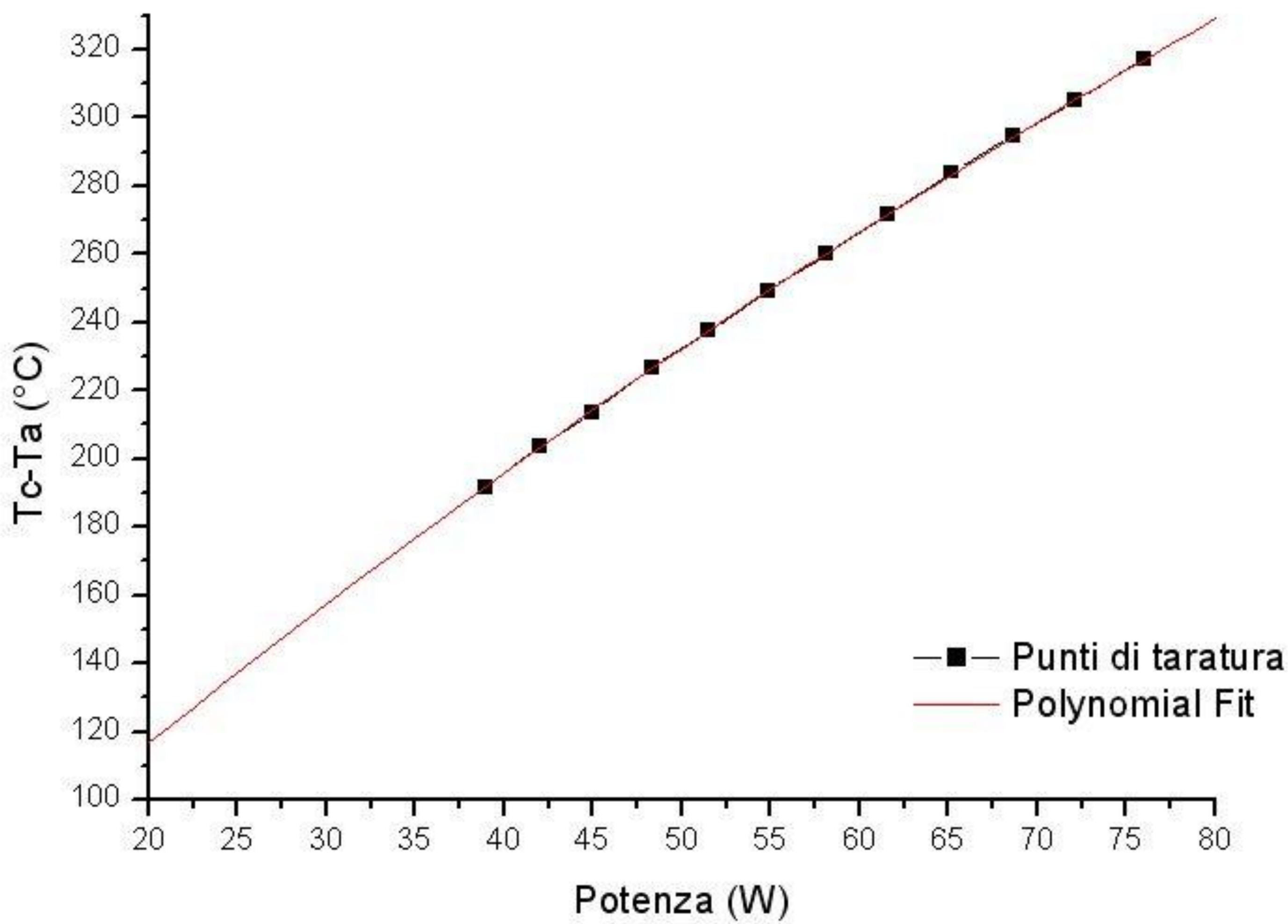
Temperatures are referred to the lab temperature (Tc-Ta)

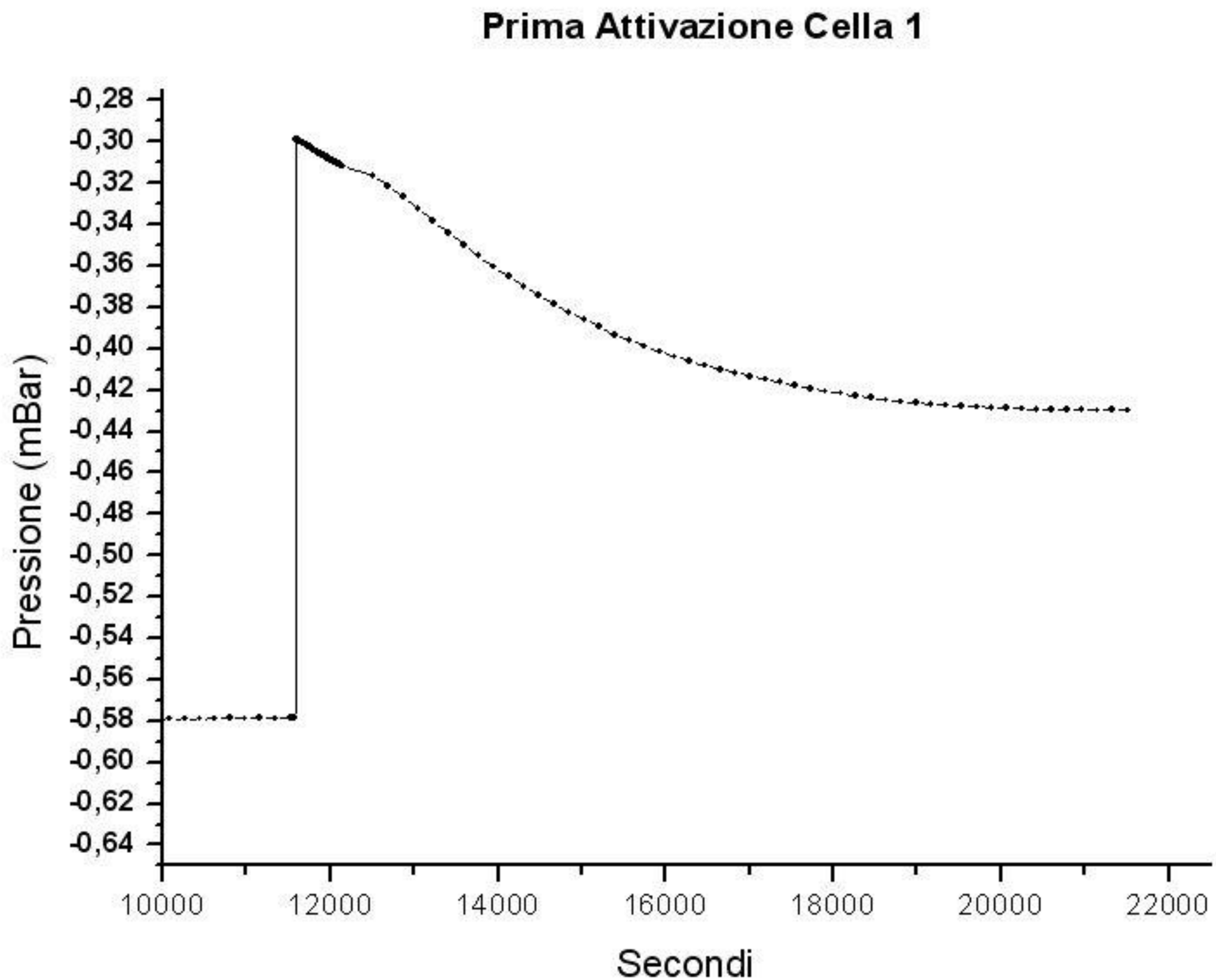




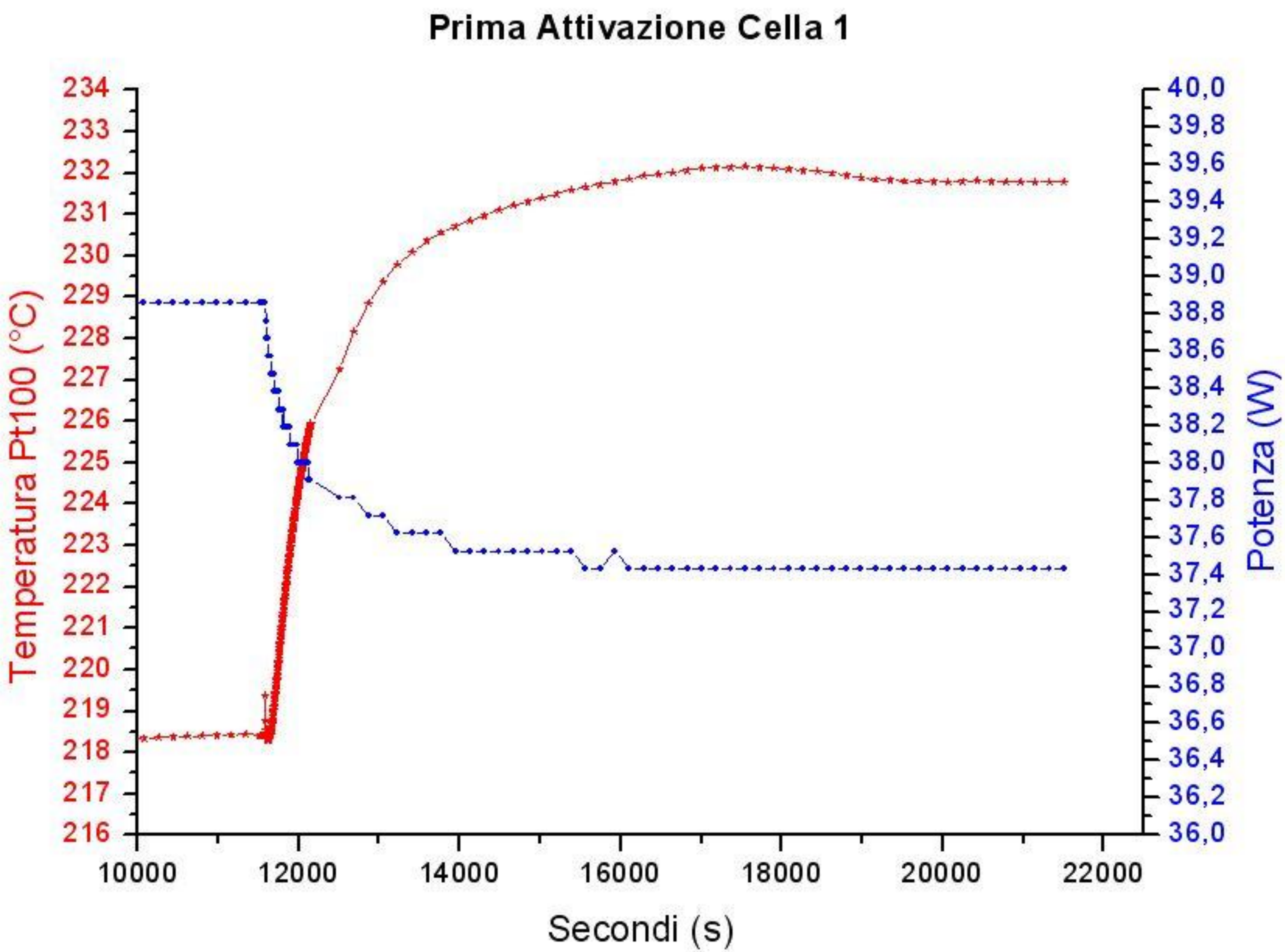
A sample excitation performed with a temperature jump (Tc1(3), Tc2(•), Tc3(2) are the temperatures in the positions shown in Fig. An inversion between Tc2 and Tc3 can be observed. Such an effect is due to the larger extra power production by the nickel rod in Tc3

Taratura Cella 1 - 2008

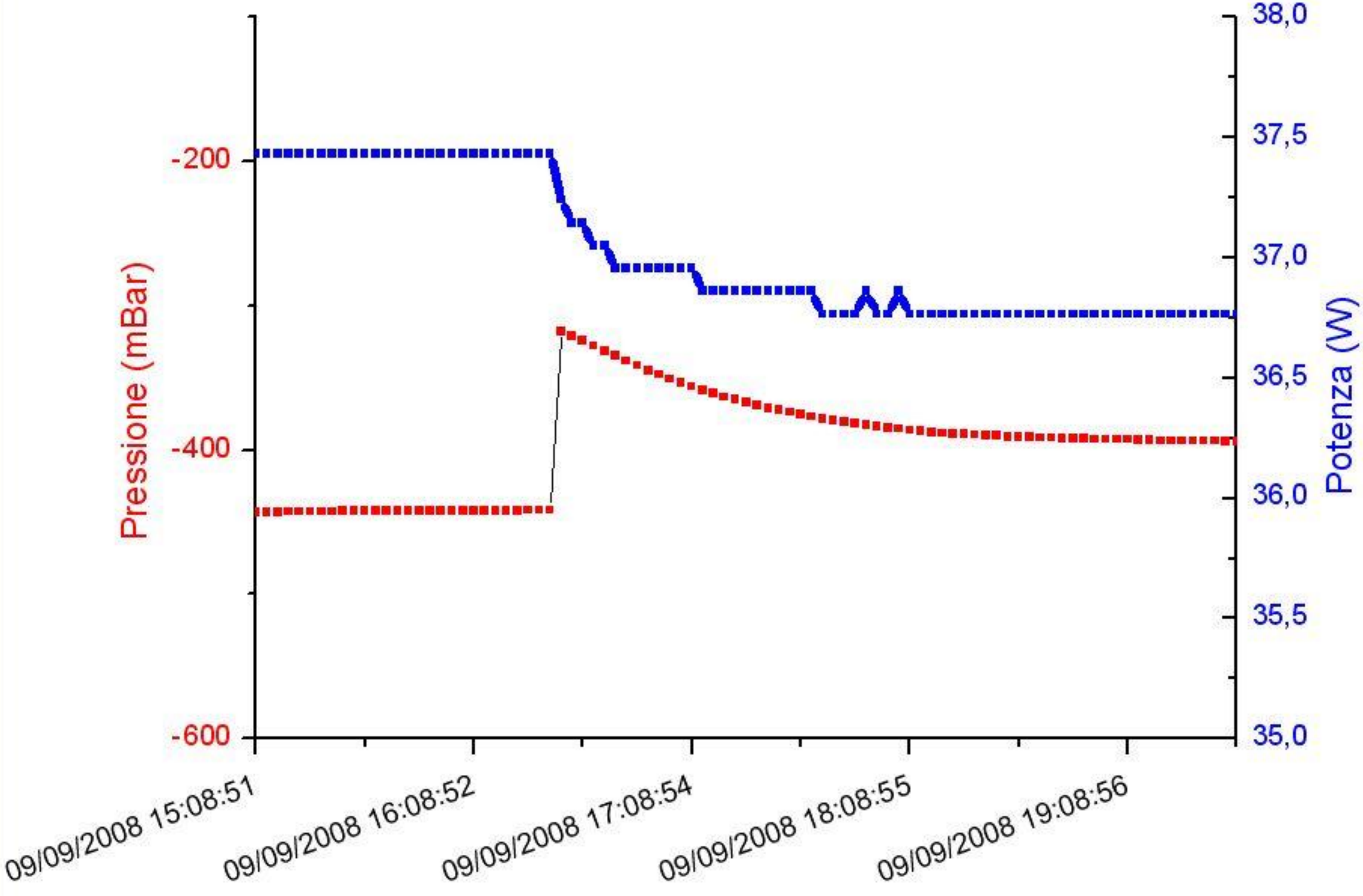




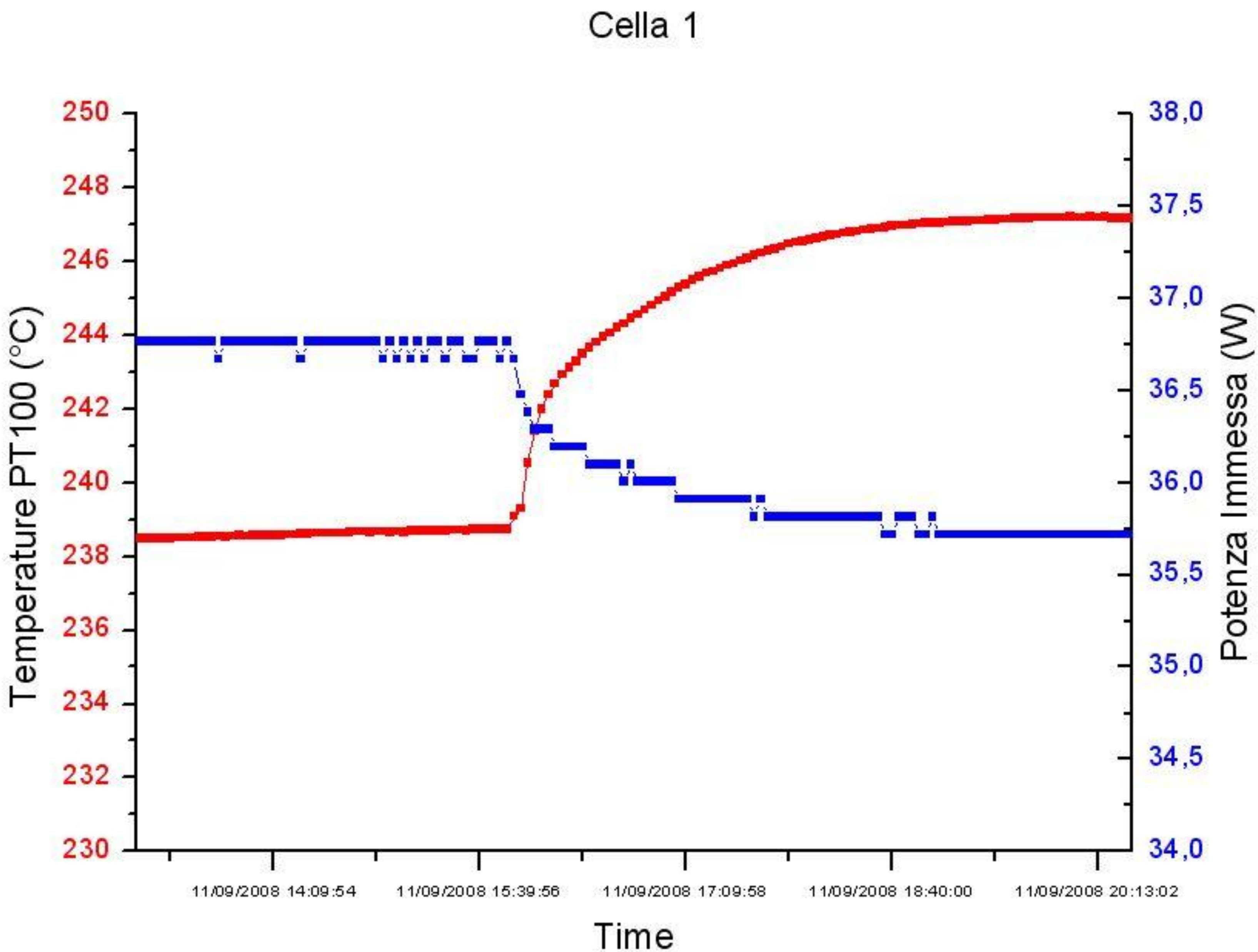
Prima Attivazione Cella 1
Pressione (mBar)
-0,28
-0,30
-0,32
-0,34
-0,36
-0,38
-0,40
-0,42
-0,44
-0,46
-0,48
-0,50
-0,52
-0,54
-0,56
-0,58
-0,60
-0,62
-0,64
10000
12000
14000
16000
18000
20000
22000
Secondi

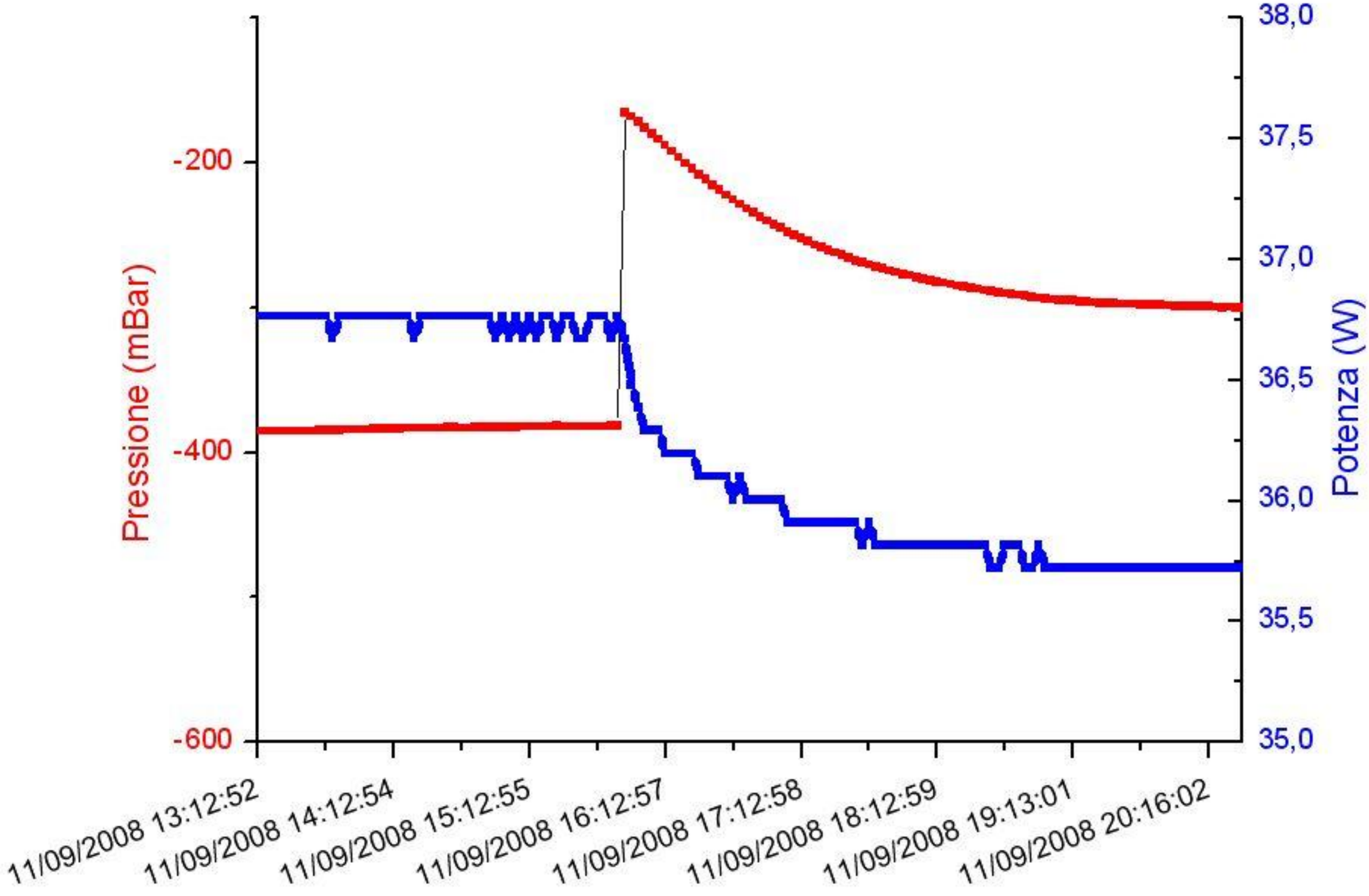


Prima Attivazione Cella 1
Temperatura Pt100 (°C)
Potenza (W)
Secondi (s)
234
233
232
231
230
229
228
227
226
225
224
223
222
221
220
219
218
217
216
40,0
39,8
39,6
39,4
39,2
39,0
38,8
38,6
38,4
38,2
38,0
37,8
37,6
37,4
37,2
37,0
36,8
36,6
36,4
36,2
36,0
10000
12000
14000
16000
18000
20000
22000



Pressione (mBar)
-200
-400
-600
Potenza (W)
38,0
37,5
37,0
36,5
36,0
35,5
35,0
09/09/2008 15:08:51
09/09/2008 16:08:52
09/09/2008 17:08:54
09/09/2008 18:08:55
09/09/2008 19:08:56


Cella 1
250
248
246
244
242
240
238
236
234
232
230
Temperature PT100 (°C)
38,0
37,5
37,0
36,5
36,0
35,5
35,0
34,5
34,0
Potenza Immessa (W)
11/09/2008 14:09:54
11/09/2008 15:39:56
11/09/2008 17:09:58
11/09/2008 18:40:00
11/09/2008 20:13:02
Time



Pressione (mBar)
Potenza (W)
-200
-400
-600
38,0
37,5
37,0
36,5
36,0
35,5
35,0
11/09/2008 13:12:52
11/09/2008 14:12:54
11/09/2008 15:12:55
11/09/2008 16:12:57
11/09/2008 17:12:58
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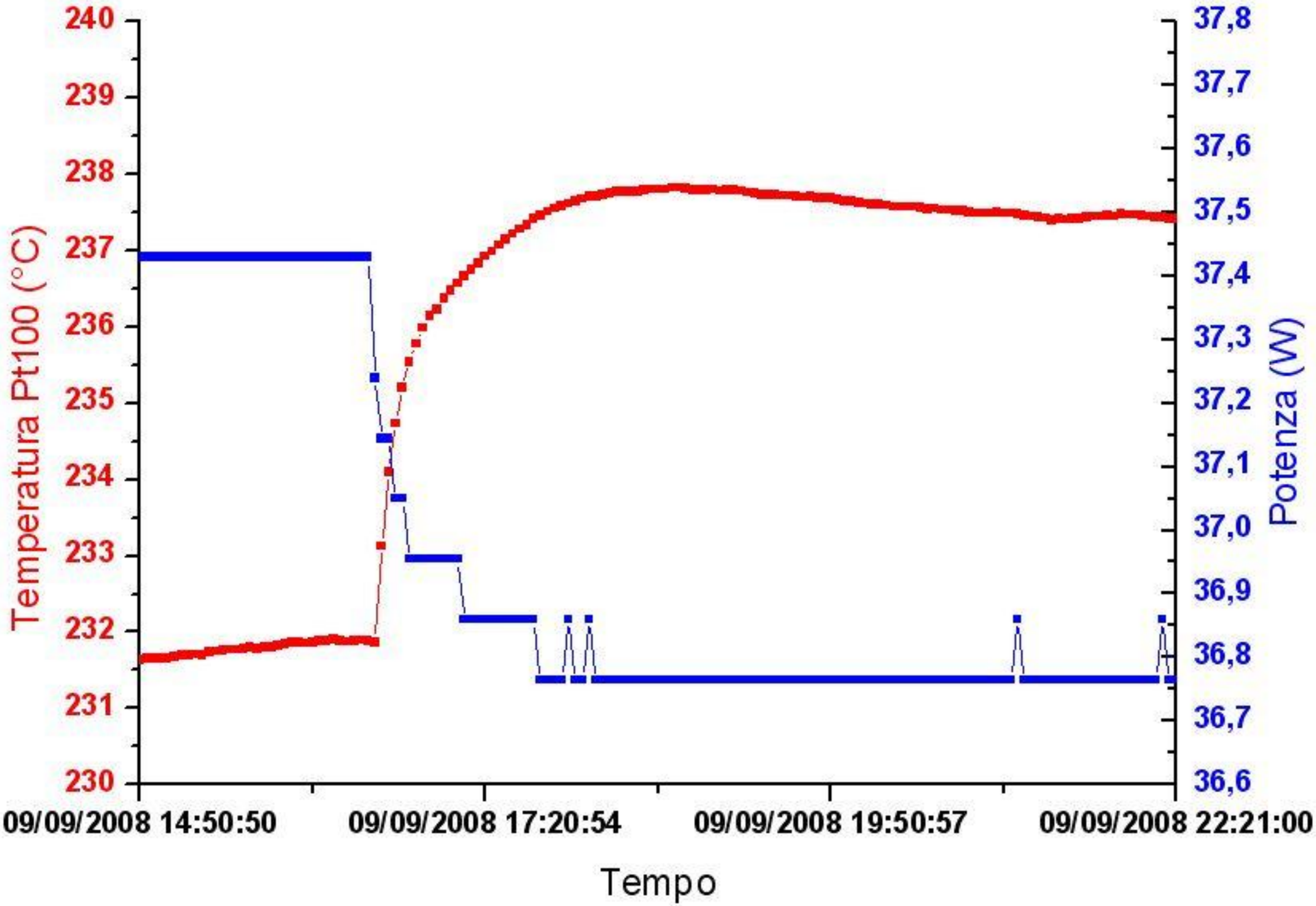
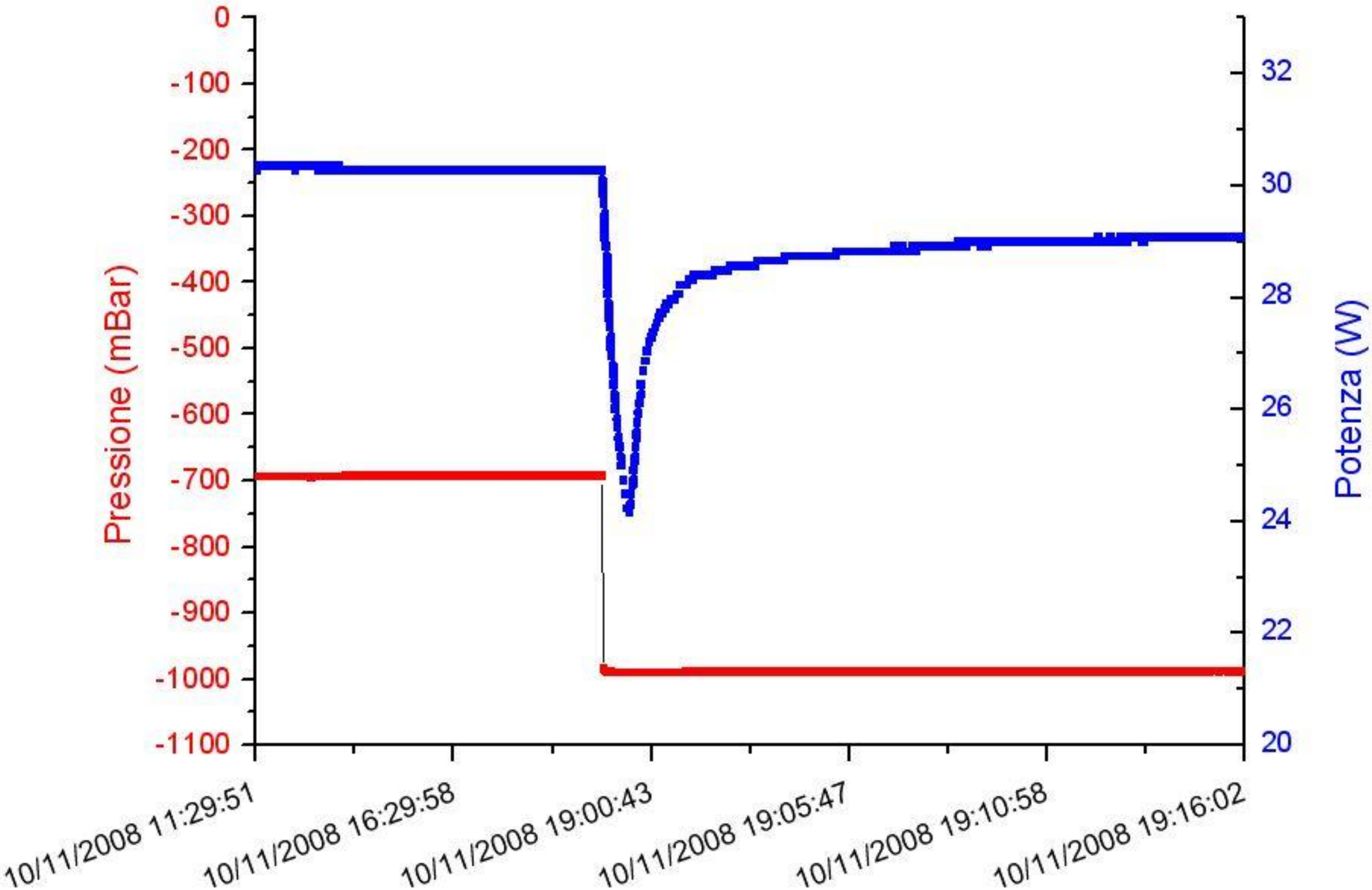
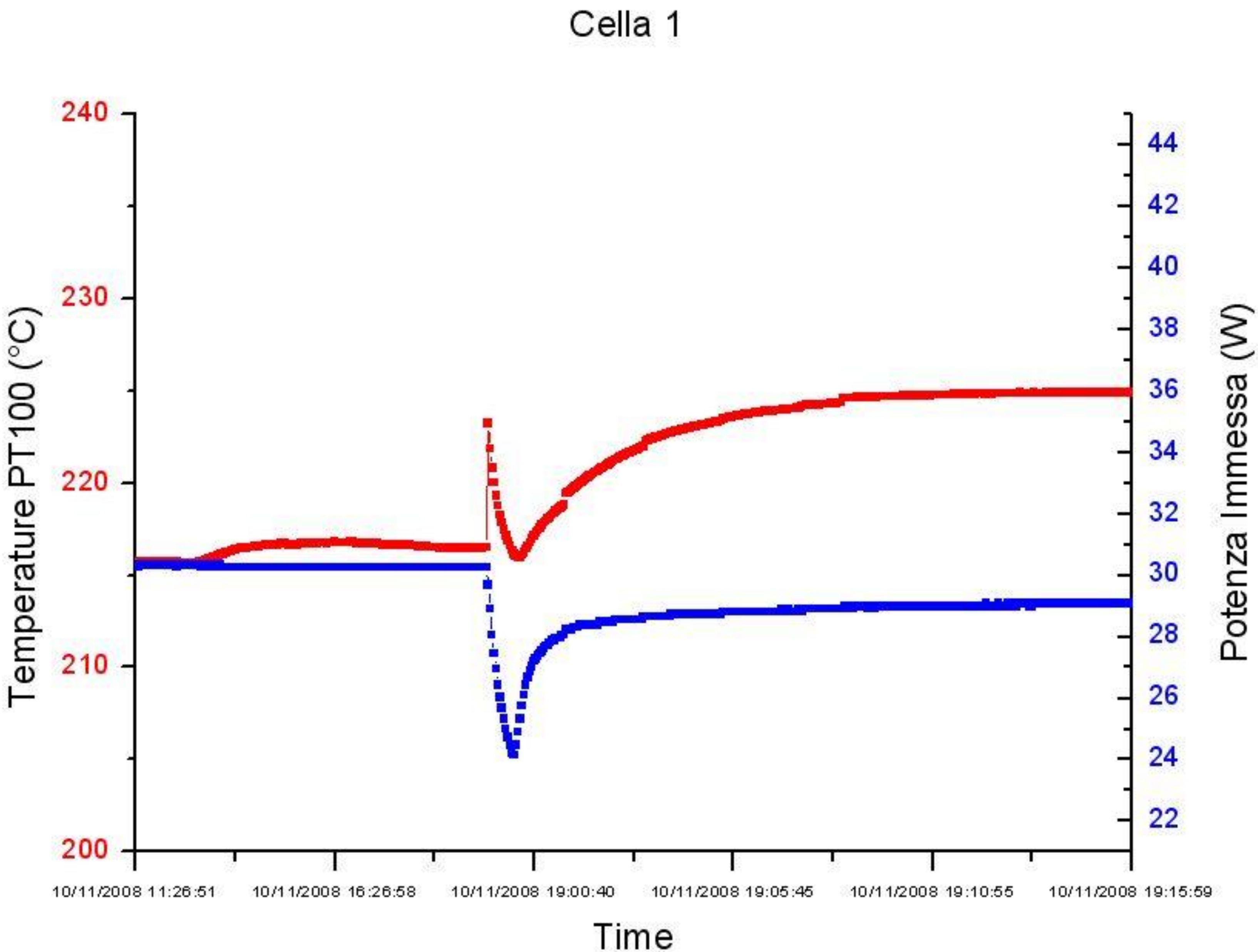
11/09/2008 19:13:01
11/09/2008 20:16:02

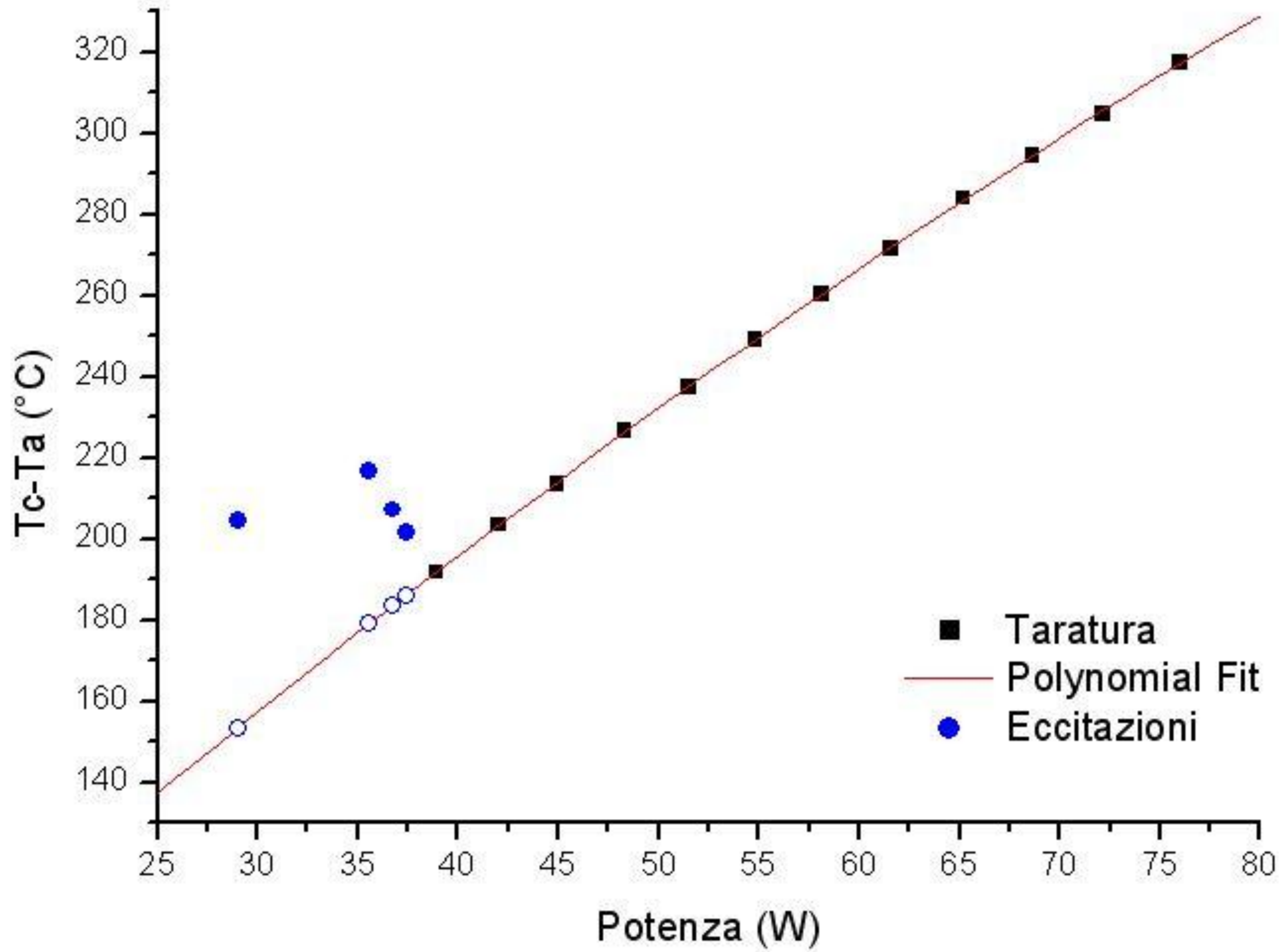


240
239
238
237
236
235
234
233
232
231
230
Temperatura Pt100 (°C)
37,8
37,7
37,6
37,5
37,4
37,3
37,2
37,1
37,0
36,9
36,8
36,7
36,6
Potenza (W)
09/09/2008 14:50:50
09/09/2008 17:20:54
09/09/2008 19:50:57
09/09/2008 22:21:00
Tempo


Pressione (mBar)
Potenza (W)
0
-100
-200
-300
-400
-500
-600
-700
-800
-900
-1000
-1100
32
30
28
26
24
22
20
10/11/2008 11:29:51
10/11/2008 16:29:58
10/11/2008 19:00:43
10/11/2008 19:05:47
10/11/2008 19:10:58
10/11/2008 19:16:02


Cella 1
Temperature PT100 (°C)
240
230
220
210
200
Potenza Immessa (W)
44
42
40
38
36
34
32
30
28
26
24
22
10/11/2008 11:26:51
10/11/2008 16:26:58
10/11/2008 19:00:40
10/11/2008 19:05:45
10/11/2008 19:10:55
10/11/2008 19:15:59
Time

Taratura Cella 1 - 2008



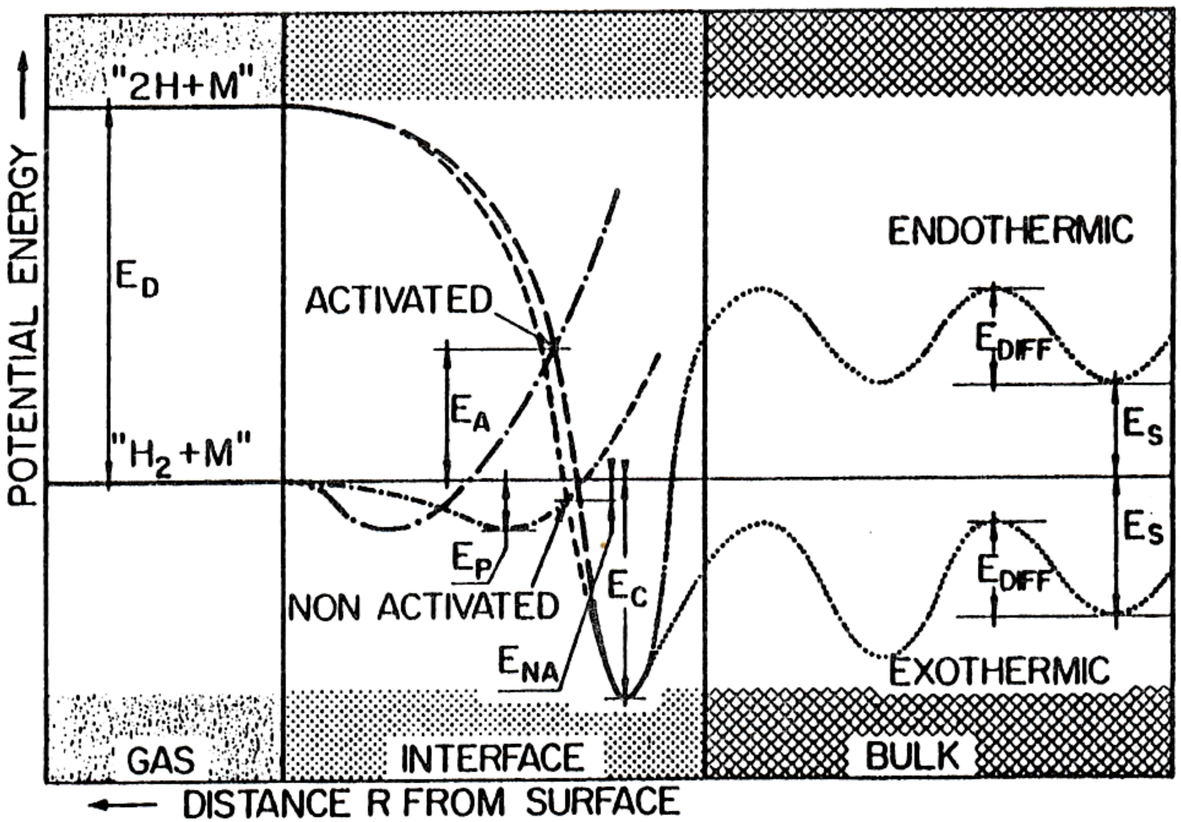
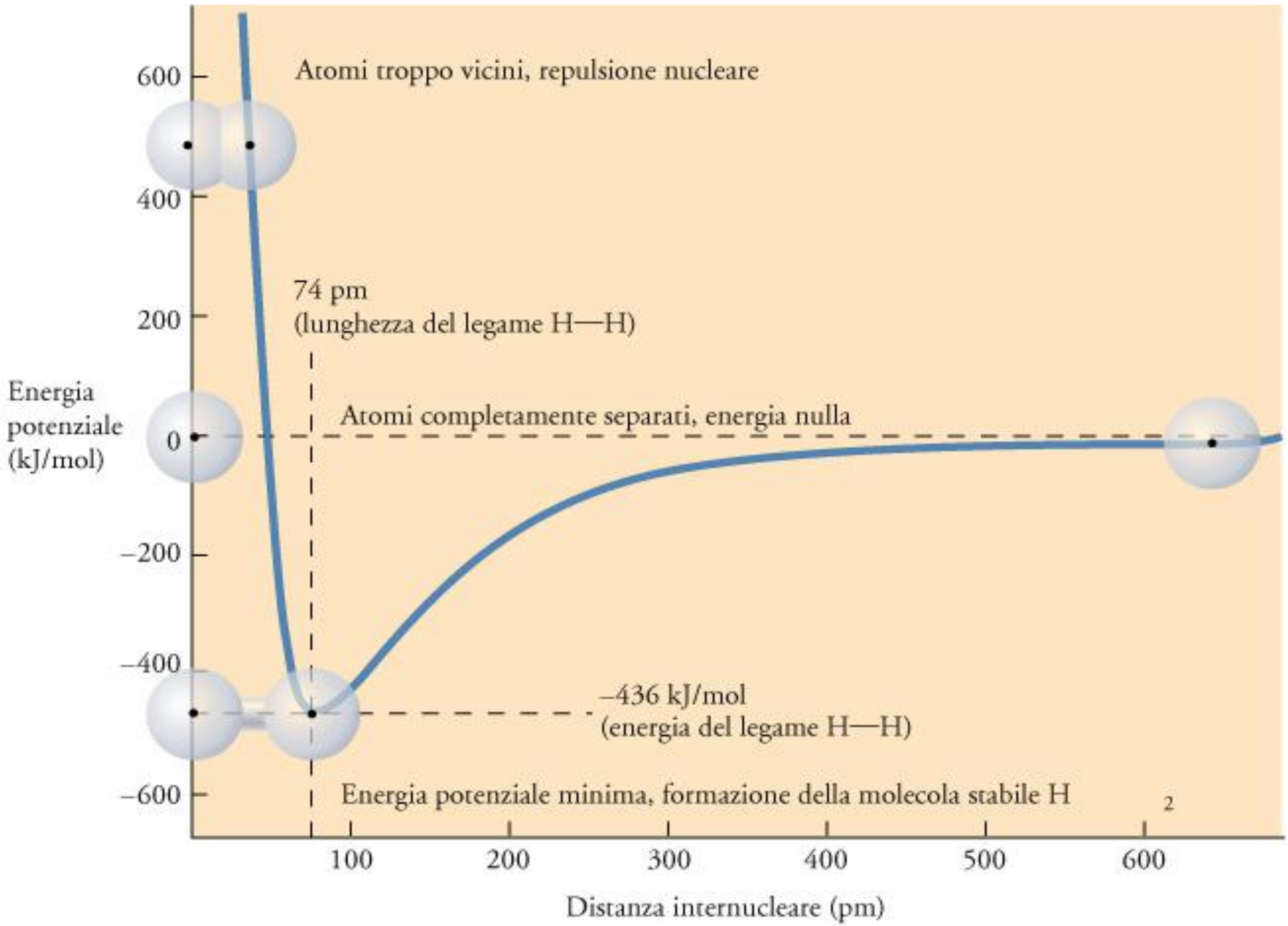
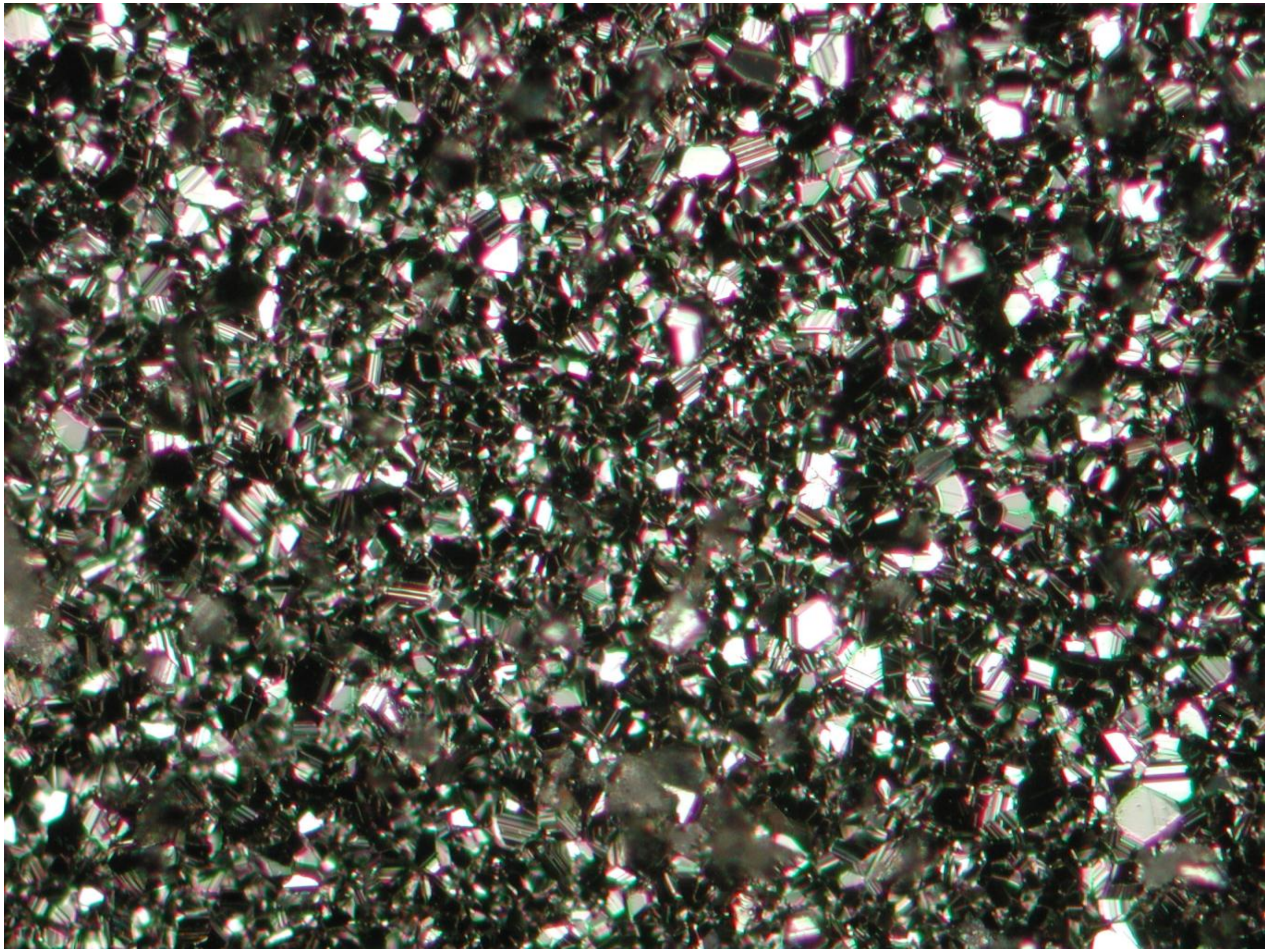
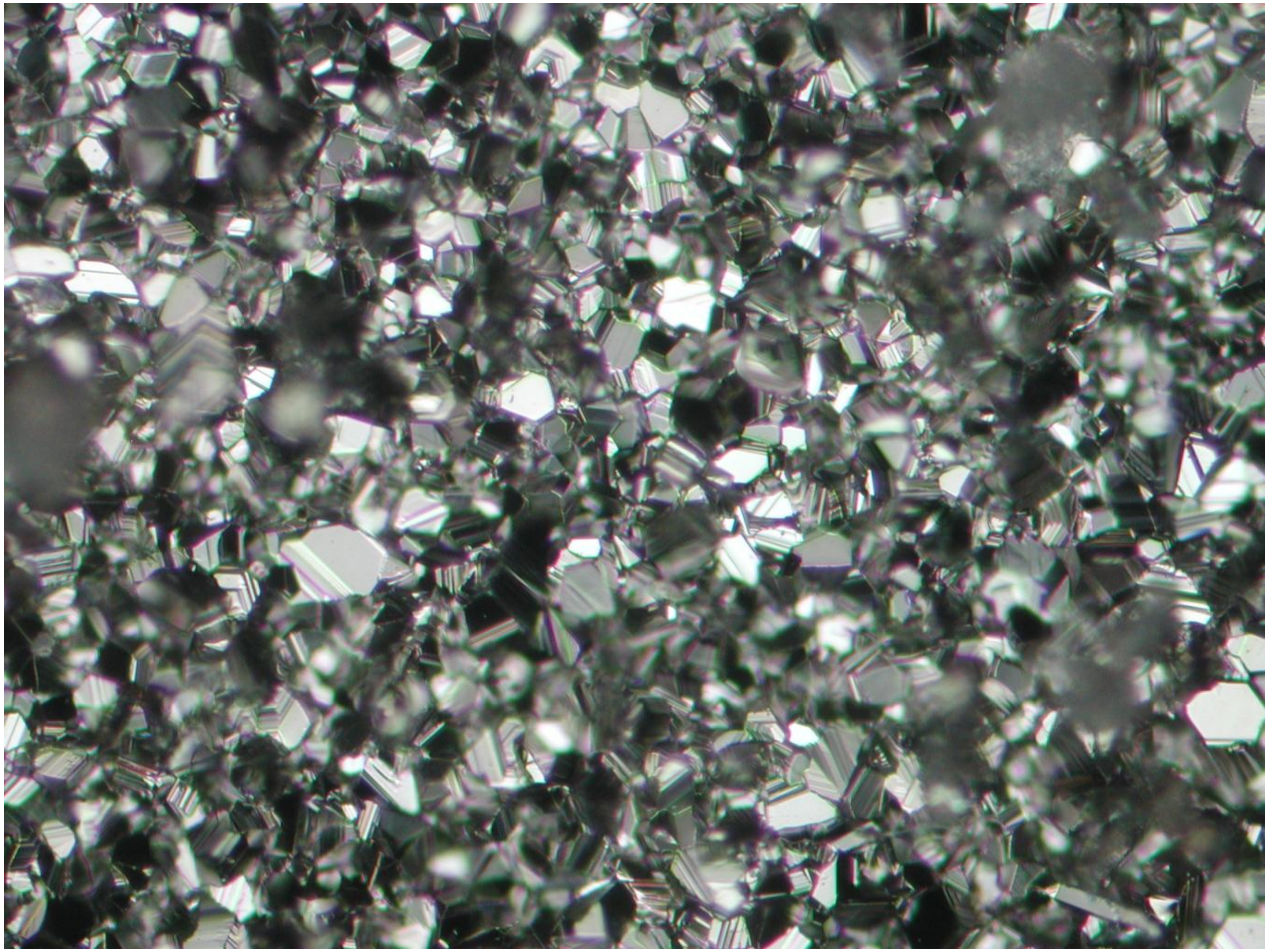


Fig. 2.1. Potential energy curves for activated and non-activated chemisorption of hydrogen on a clean metal surface and exothermic or endothermic solution in the bulk. A more pronounced minimum just below the surface allows for subsurface hydrogen (one-dimensional Lennard–Jones potential [2.53])



Atomi troppo vicini, repulsione nucleare
74 pm
(lunghezza del legame H—H)
Energia potenziale (kJ/mol)
Atomi completamente separati, energia nulla
–436 kJ/mol
(energia del legame H—H)
Energia potenziale minima, formazione della molecola stabile H 2
600
400
200
0
–200
–400
–600
100
200
300
400
500
600
Distanza internucleare (pm)





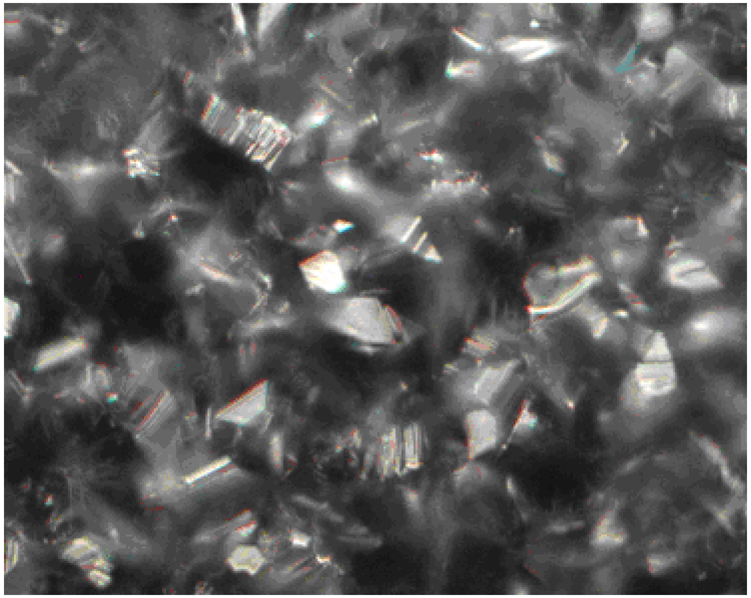
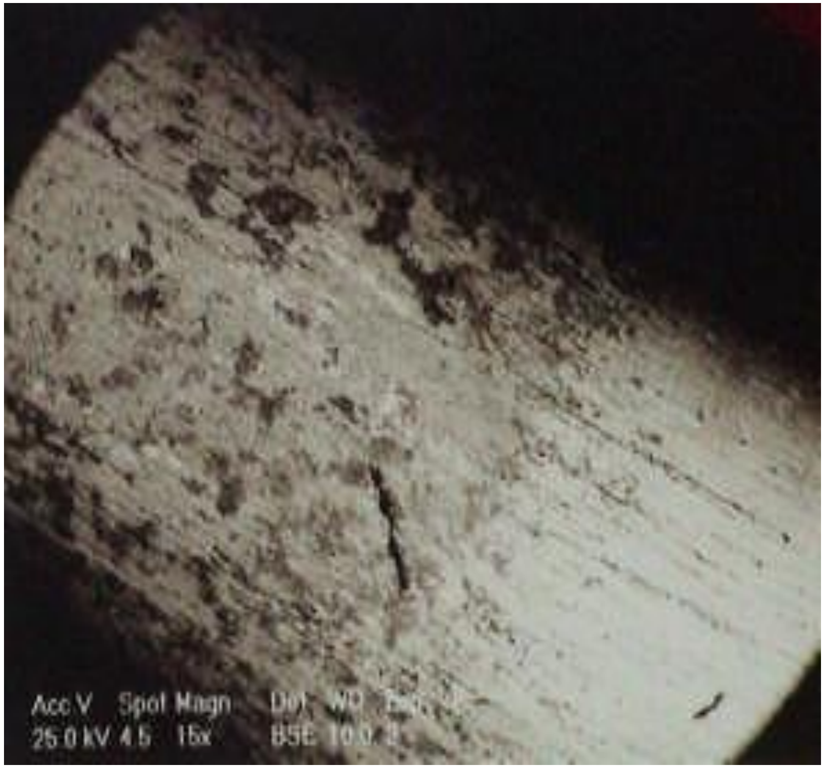


Figura 4 : Nanostruttura a "cluster"


Acc.V Spot Magn Det WD
25.0 kV 4.5 15x BSE 10.0

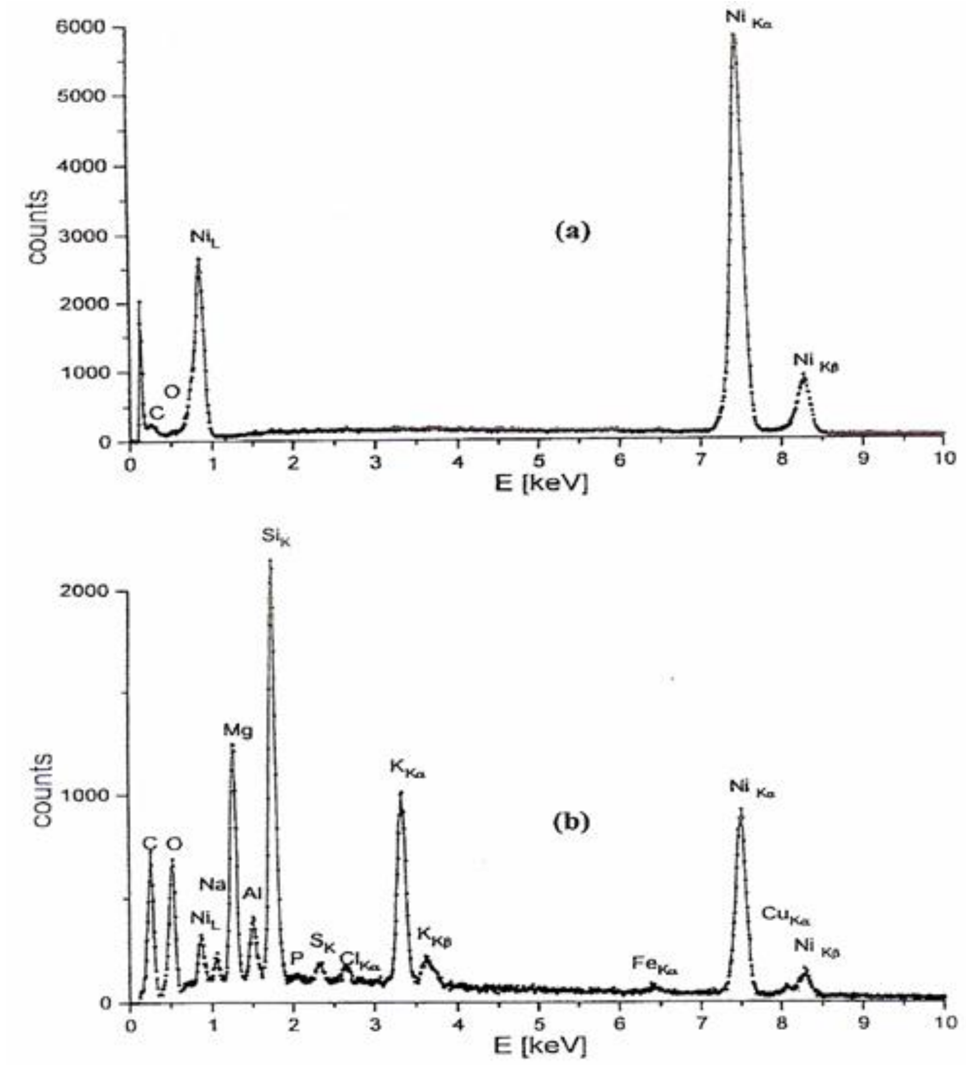
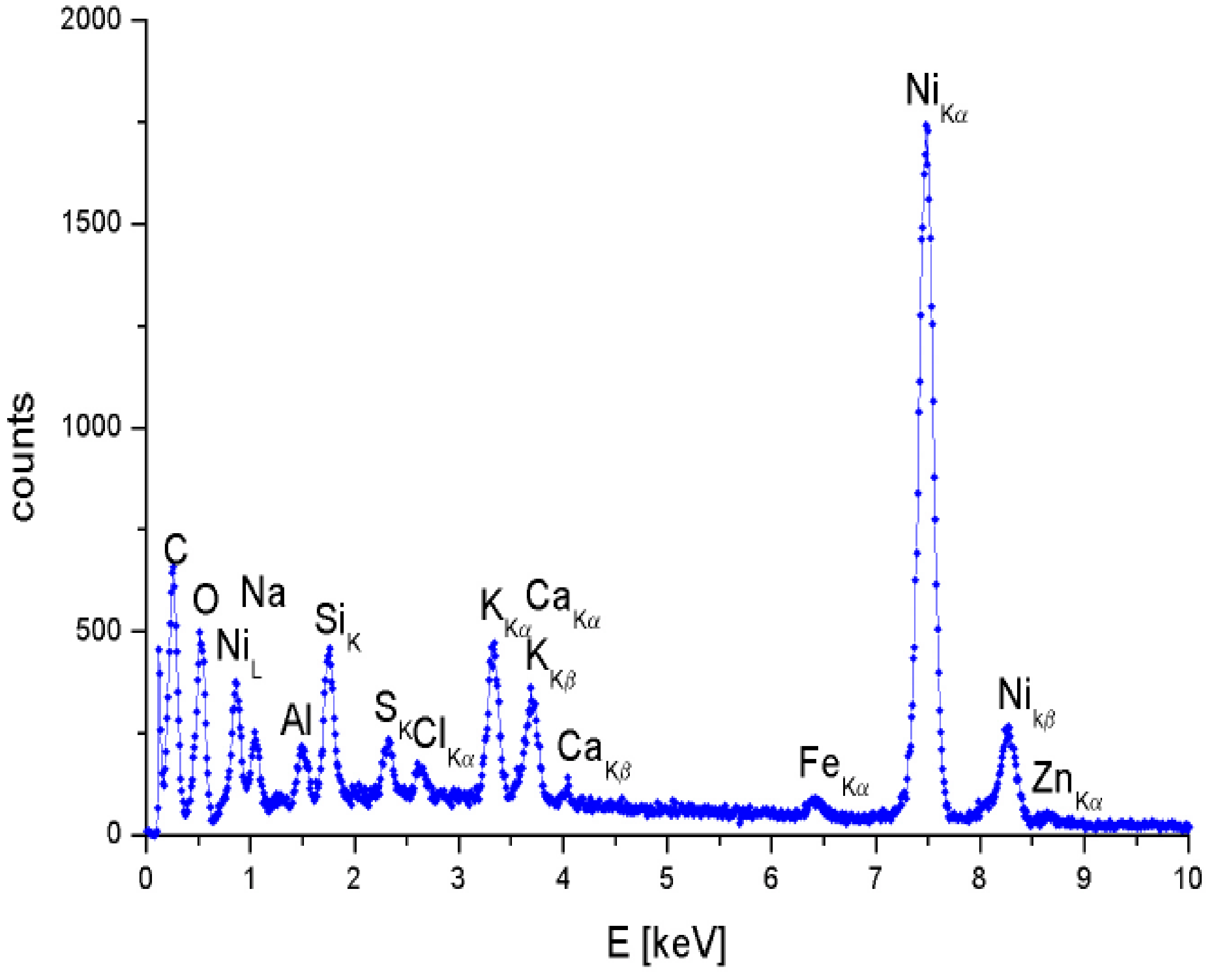


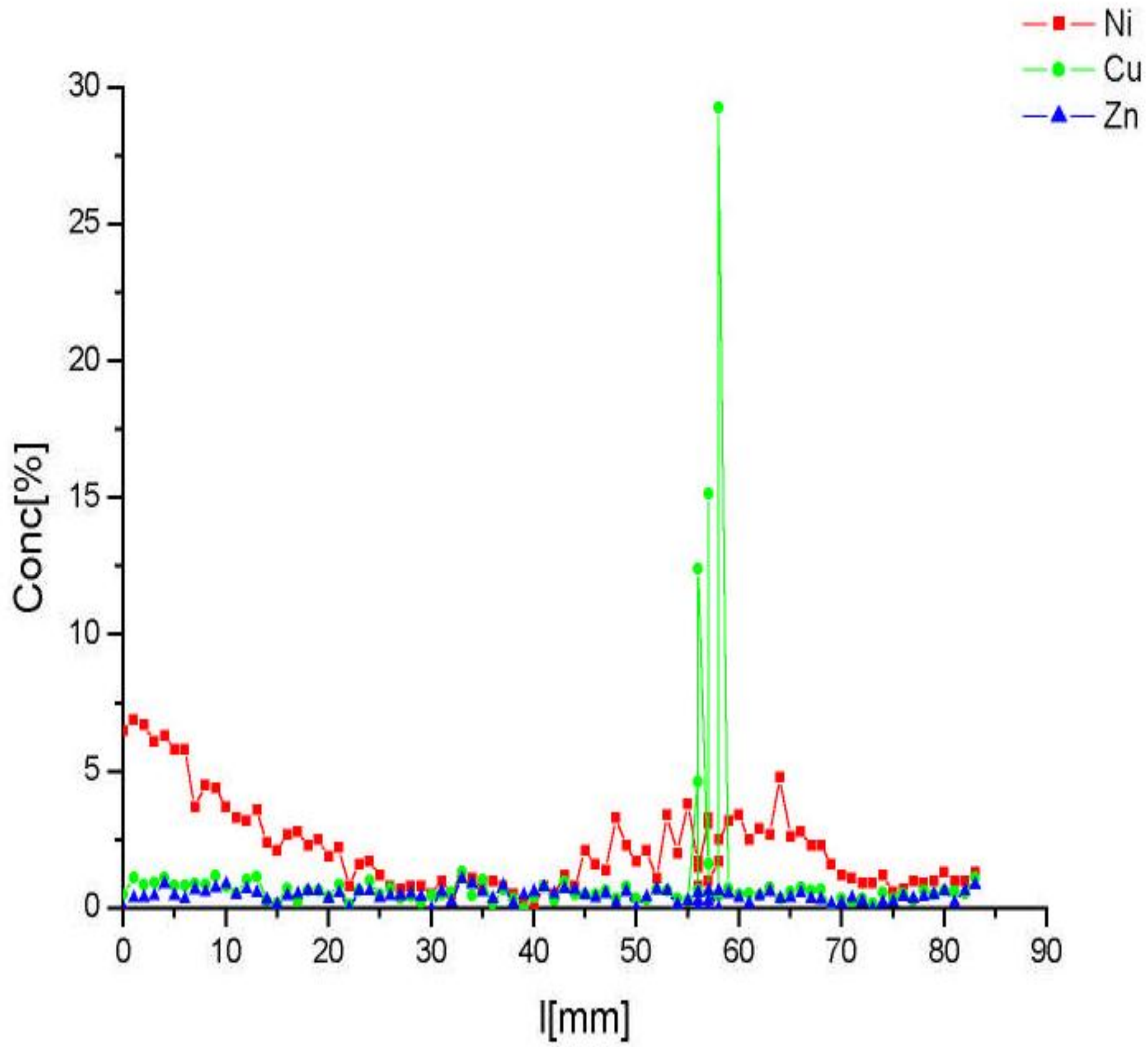
Fig. 3: SEM-EDAX analysis of the surfaces

a) spectrum detected on the rod surface in a region where there was not energy production

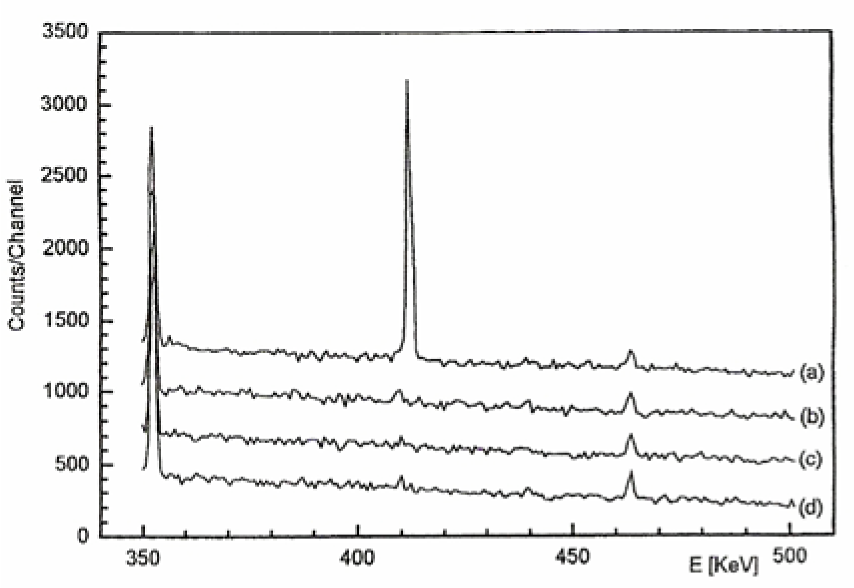
b)spectrum detected on the rod surface in a region where there was energy production as measured by means of the temperature on the external cell surface



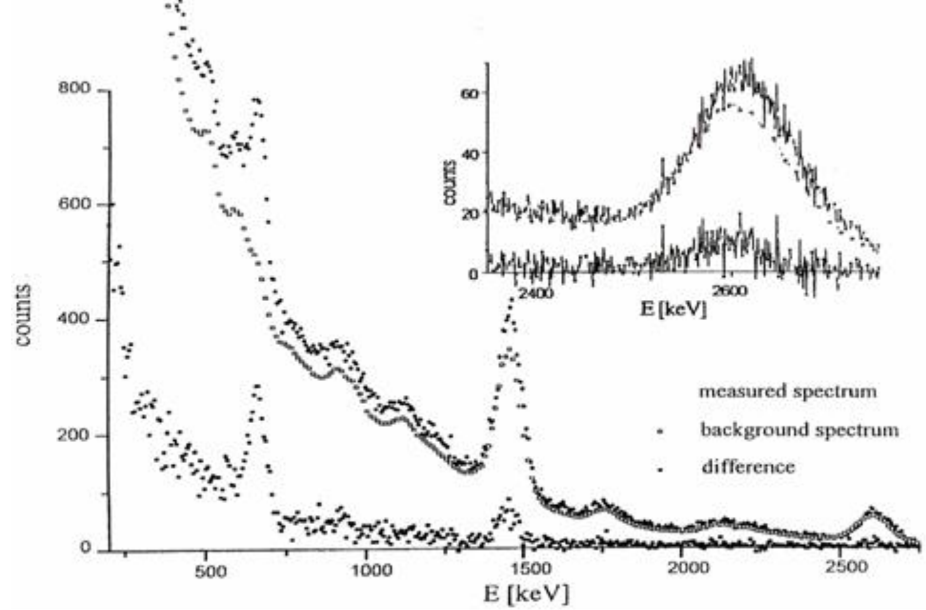
Example of elemental analysis of the sample



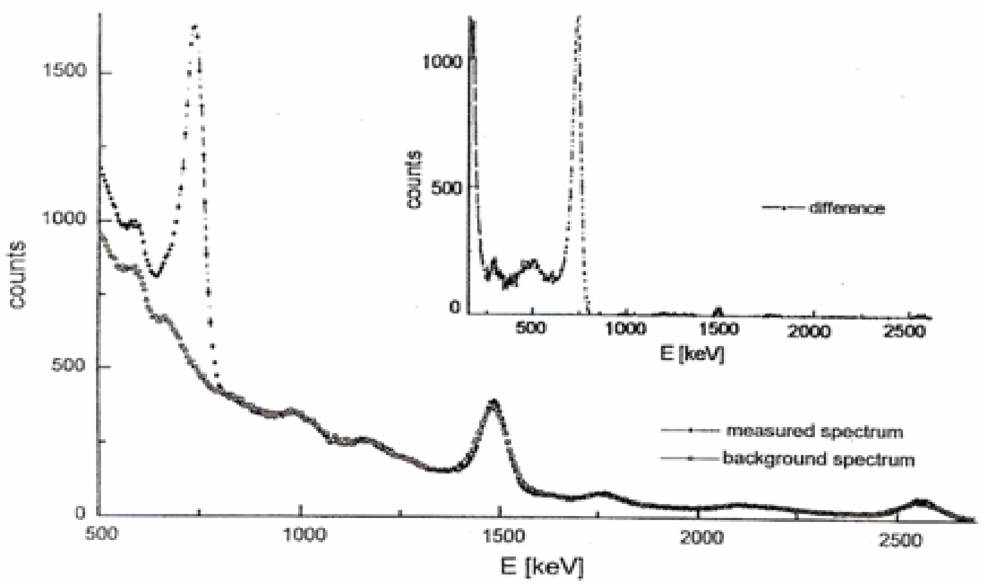
Spatial distribution of Ni and Cu on the sample surface



411 KeV peak of the Au activated by neutrons

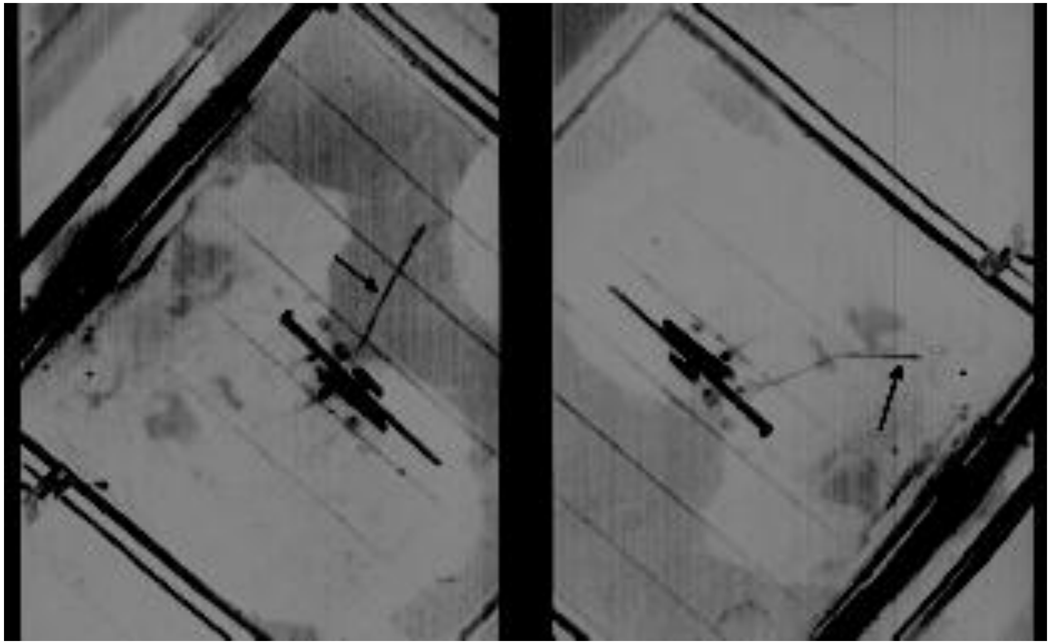


Photon enission spectrum NaI(Tl) detector

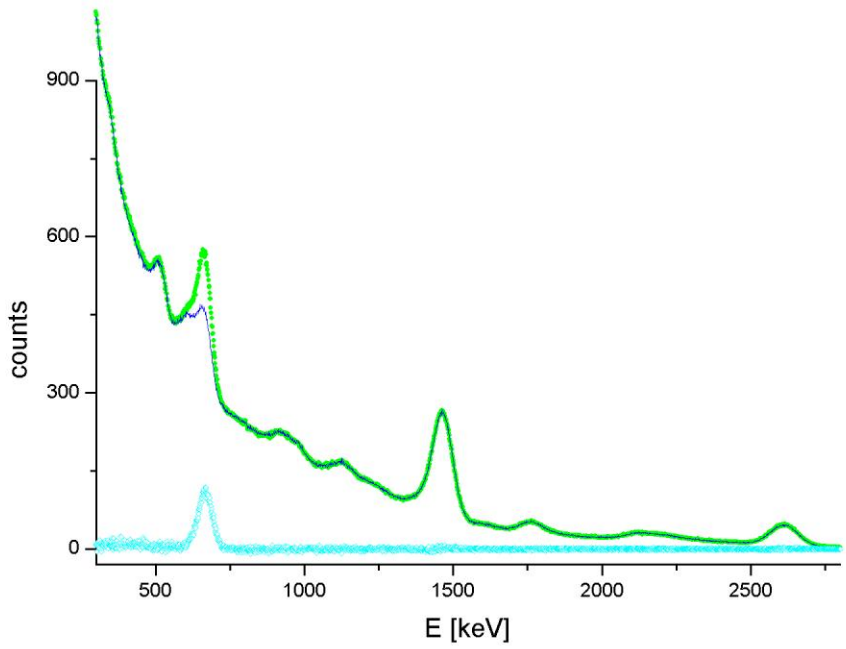


Photon enission spectrum NaI(Tl) detector

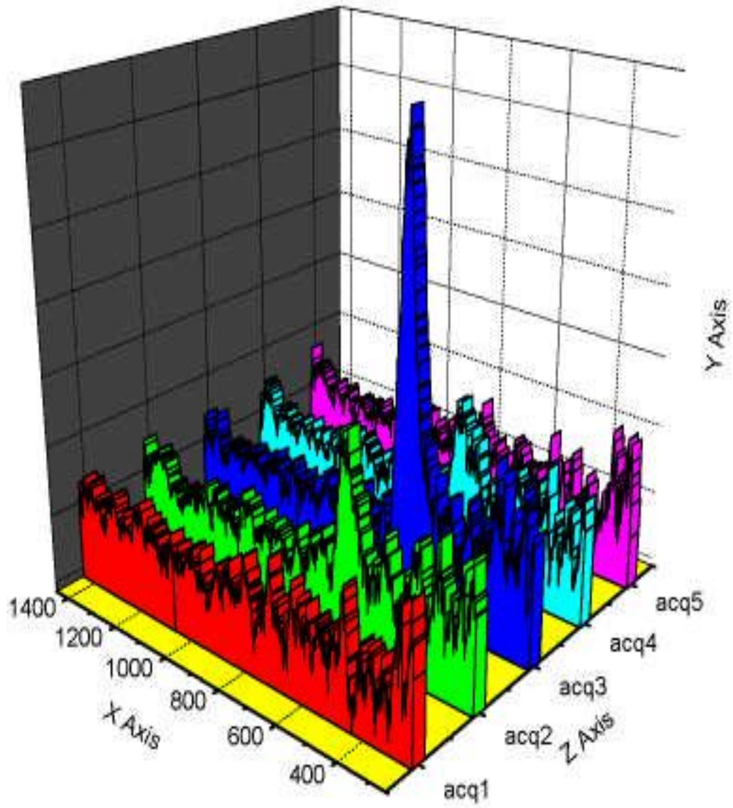
Heavy particles emitted by Ni rod after extraction from the cell



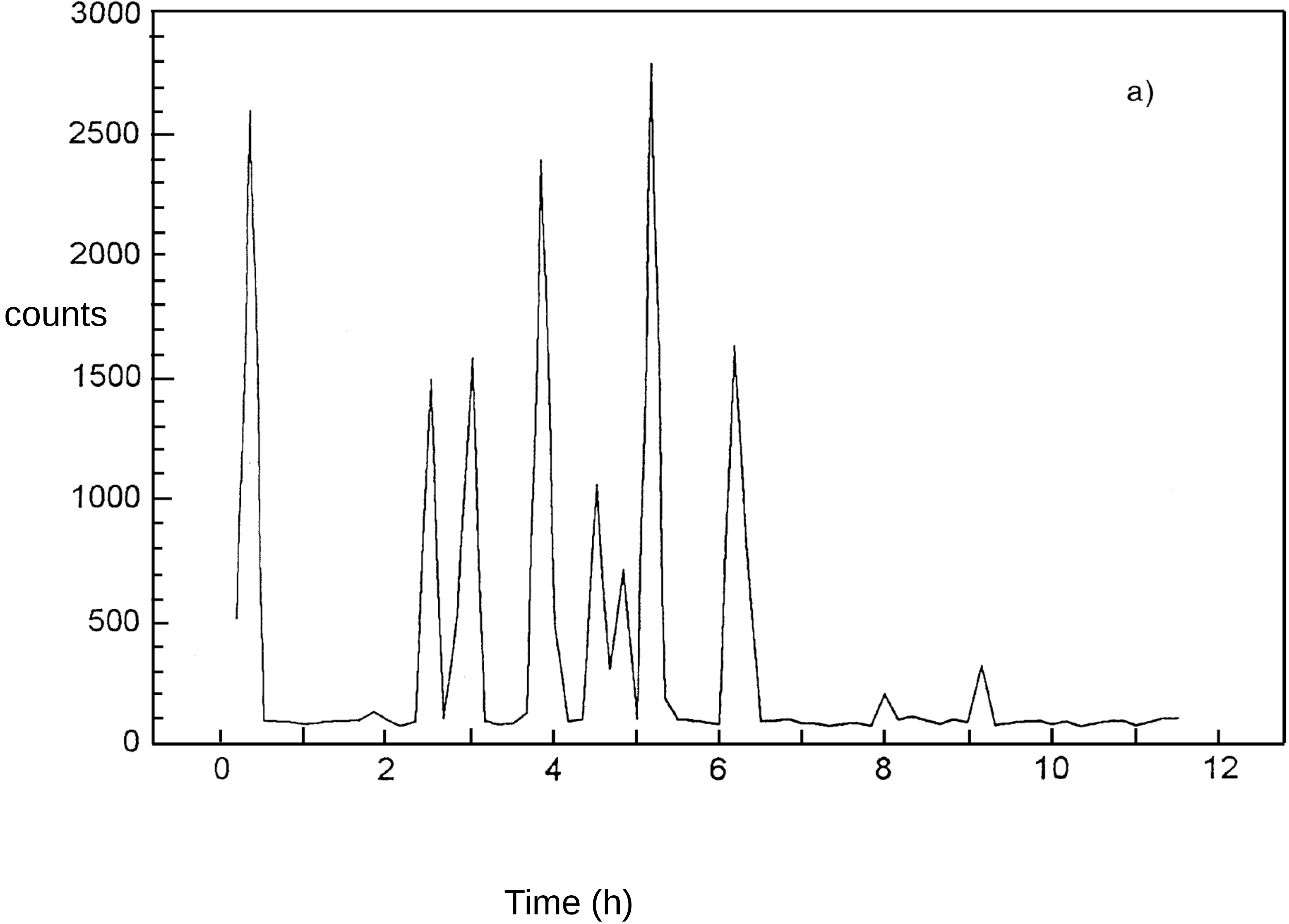
Two tracks from a sample which produced energy.

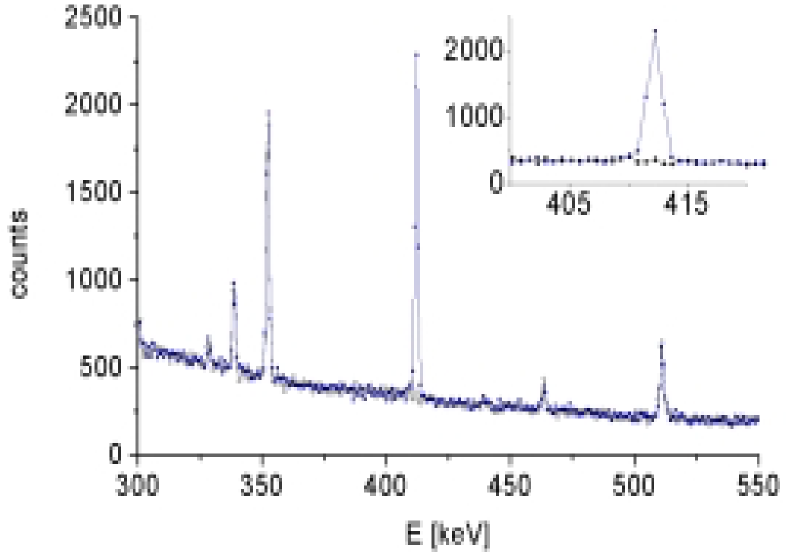


900
600
300
0
counts
500
1000
1500
2000
2500
E [keV]

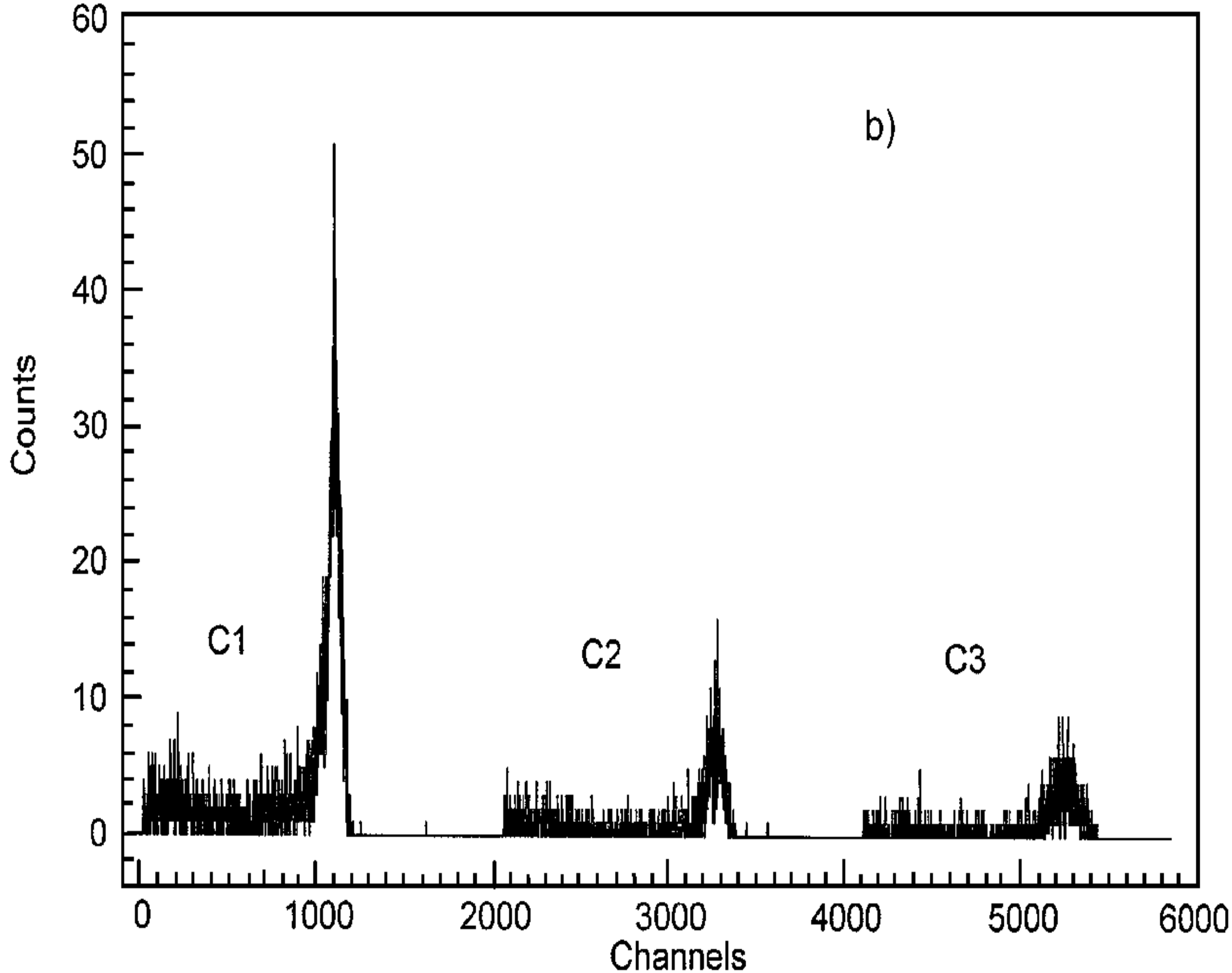


NaI(Tl)-rays spectrum showing a peak superimposed on the background. Five following acquisitions are shown

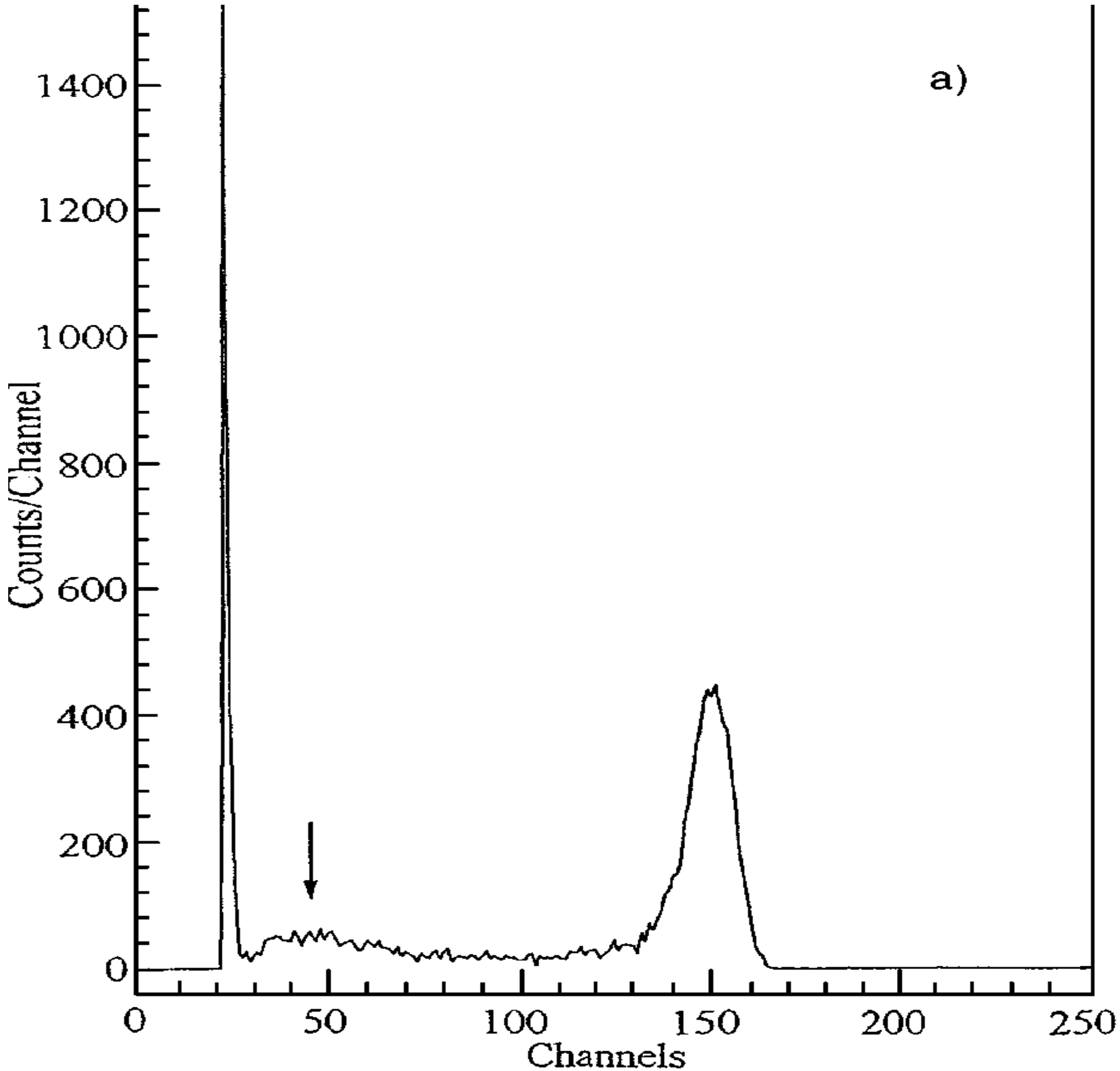

3000
2500
2000
counts
1500
1000
500
0
a)
0
2
4
6
8
10
12
Time (h)



HpGe spectra of activated and not activated Gold. Details of the region around 412 keV are shown in the insert.



a) Amplitude spectrum obtained on utilizing detector C2 and an Am-Be neutron source. The arrow indicates the electronic threshold chosen for measurements.
b) Amplitude spectra of detectors C1, C2 and C3 placed near the cell in the measurement con¯guration. The three spectra were obtained with the same MCA in multichannel mode (2000 channels for every detector). The three peaks correspond in the new scale to the right peak shown in a).


a)
Counts/Channel
0
200
400
600
800
1000
1200
1400
0
50
100
150
200
250
Channels

counts

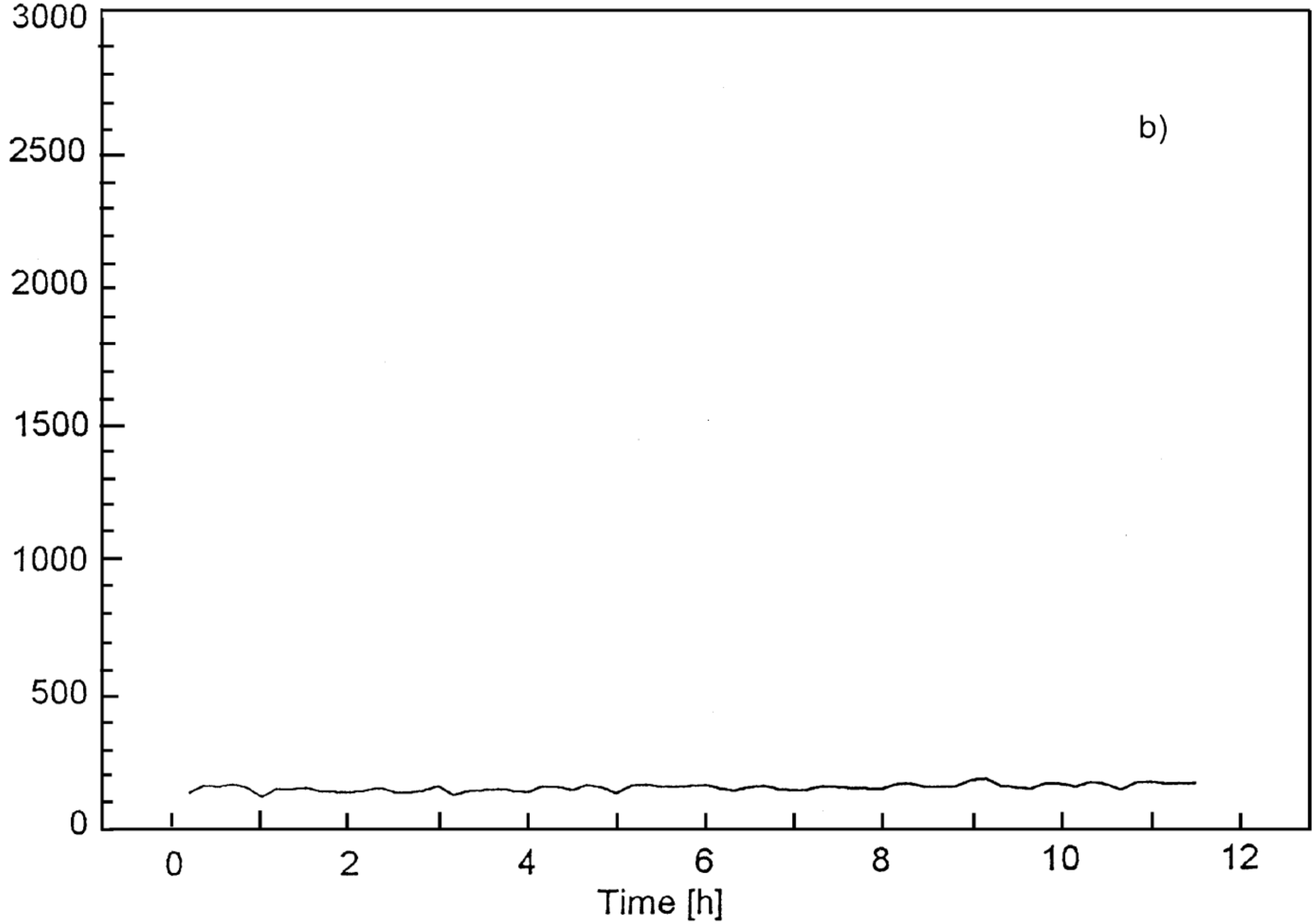


Fig. 2. { a) Counting rate of detector C2 placed 39 cm away from the cell (11 March 1995). Each point represents the number of pulses recorded in 10 minutes. b) Counting rate of detector C1 placed 10m away from the cell (laboratory background). Each point represents the number ofpulses recorded in 10 minutes.

K F Chackett *et al* 1962 *Proc. Phys. Soc.* **80** 738
doi: 10.1088/0370-1328/80/3/317

Article References Cited By

Tag this article Full text PDF (231 KB)

Abstract

The (p, n) reaction cross sections for proton bombardment of natural copper at a proton energy of 9.3 ± 0.3 MeV have been measured by an activation method. The results, 480 ± 20 mbn and 895 ± 35 mbn respectively for the isotopes 63Cu and 65Cu, when combined with accepted values of the (p, q) cross sections near this energy give a total reaction cross section of 910 ± 25 mbn, in good agreement with results obtained in this laboratory and elsewhere by direct methods.

Threshold for p,n reaction (Hauser –Feshbach theory and experimental results)

Protons with energies below 5 MeV, were used to find (*p*, *n*) thresholds and threshold limits for 26 nuclei with 37≤*A*≤112. Data are presented from several independent measurements which were made over a period of about five years; the present values supersede those presented in earlier abstracts by Trail and Johnson and by Johnson and Galonsky. Energy calibrations are based on one or more of the following absolute standards: 7Li(*p*, *n*), 1880.7±0.4 keV; 11B(*p*, *n*) 3016.4±1.5; 19F(*p*, *n*), 4234.4±1.0 keV; and 19F(*p*, *αγ*), 872.5±0.4, 934.1±0.9, 1346.6±1.1, and 1373.5±0.6 keV. Neutrons were detected in each experiment by several BF3 counters in 4*π* geometry. The yields near threshold have been interpreted in terms of the Hauser-Feshbach statistical theory of the compound nucleus, and in most cases there is good agreement with the predictions for the ground-state transitions. The targets and the corresponding negative *Q* values in keV for these ground-state transitions are as follows: 37Cl, 1596.9±2.5; 41K, 1209.7±1.5; 49Ti, 1383.6±1.0; 51V, 1533.7±1.8; 53Cr, 1380.4±1.6; 55Mn, 1014.4±0.8; 57Fe, 1619±2; 59Co, 1855.3±1.6; 61Ni, 3024±4; 65Cu, 2135.8±1.7; 67Zn, 1783.3±1.4; 68Zn, 3707±5; 69Ga, 3006±4; 70Zn, 1439±3; 71Ga, 1018±2; 74Ge, 3348±5; 75As, 1647.3±1.1; 80Se, 2653±3; 106Pd, 3754±13; 108Pd, 2670±100; and 112Cd, 3400±20. In addition, three thresholds were observed for which the comparison of the observed yield with the predictions indicates that the reactions proceed to the excited states in the residual nuclei. The three targets and the corresponding negative *Q* values in keV are as follows: 73Ge, 1189±15; 89Y, 4207±6; 93Nb, 2720±100. The fact that the 93Nb(*p*, *n*)93Mo threshold to the 1.48-MeV state was observed indicates that lower states in 93Mo have *J*<~5/2. For three other targets the yield curves showed some indication of a threshold; however, comparisons with the theory in these cases indicate that only the following upper limits can be set to -*Q* in keV; 48Ca(*p*, *n*)48Sc, <640; 82Se(*p*, *n*)82Br, <920; 93Nb(*p*, *n*)93Mo, <1290. A comparison with the theory indicates that the observed yield above 650 keV for 48Ca must be due to a transition to an excited state rather than the ground state of 48Sc.

Conclusions and perspectives

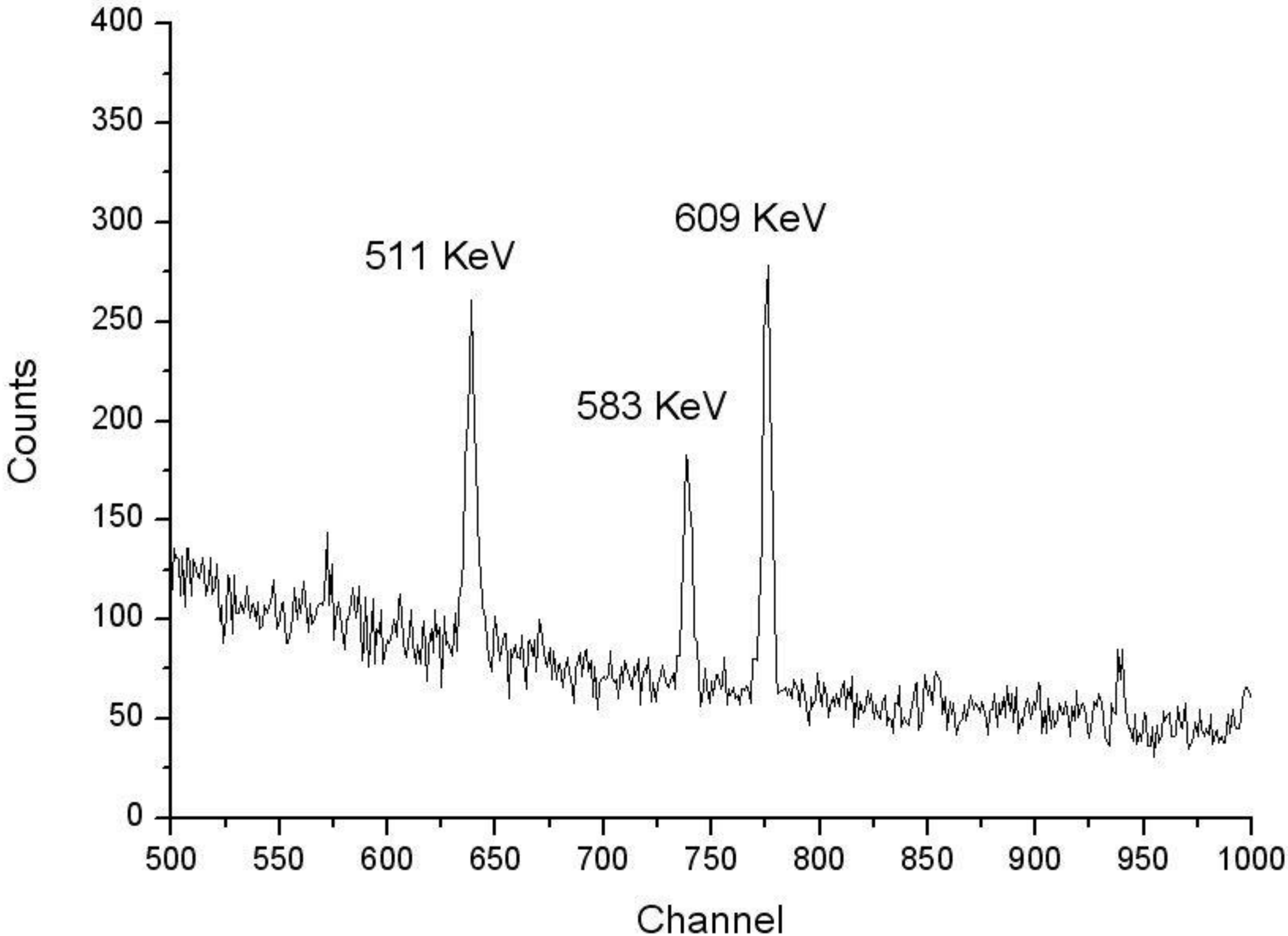
****We are very close to the auto-sustenance (less than 20W introduced and 71W produced = 91W)(t=260°C) => we want to evaluate the possibility to increase the produced power to more than 100W***

*****We have seen that the energy production can be obtained between 200°C and 400°C => we want to evaluate the best temperature interval inside that region***

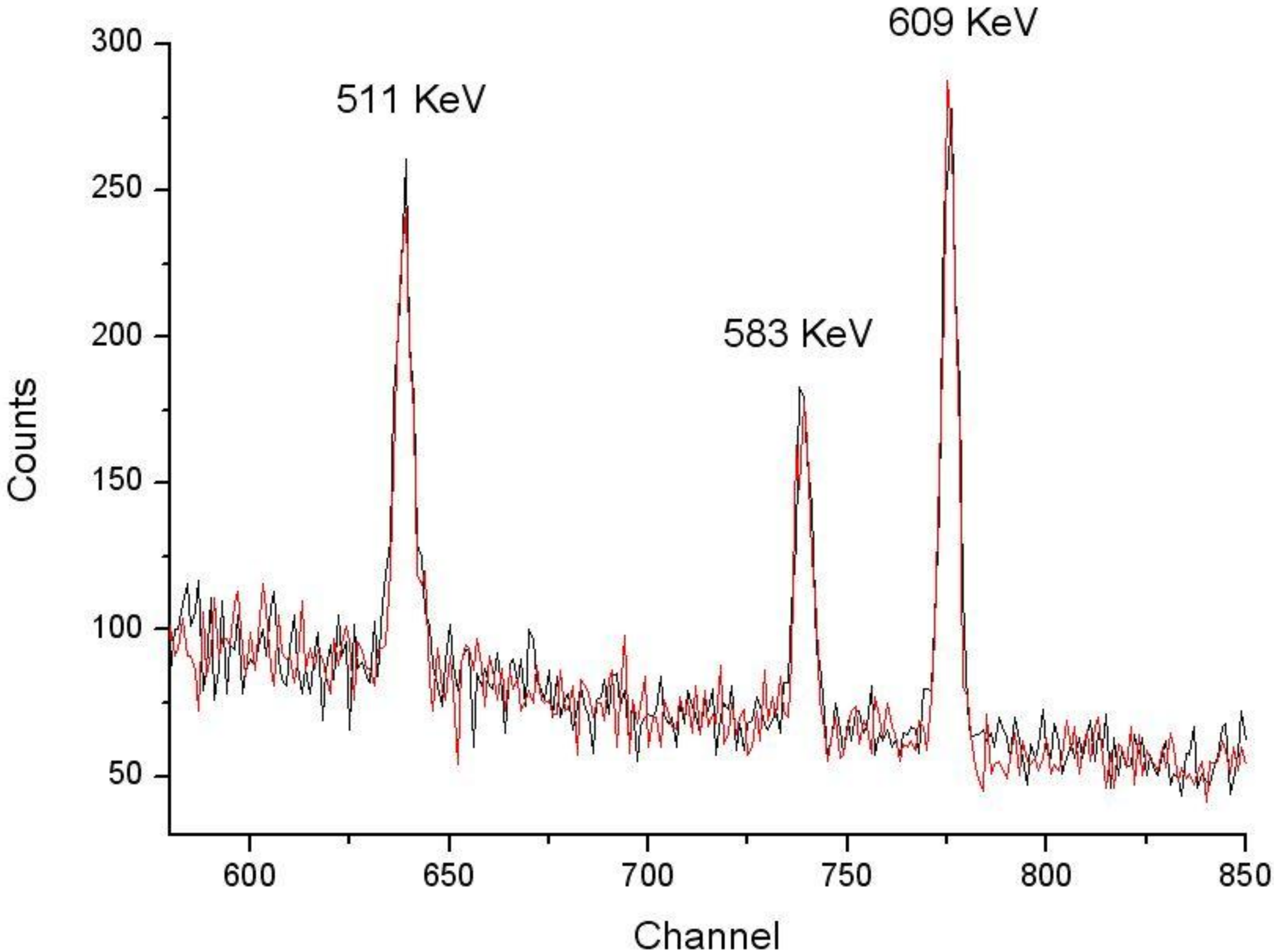
******We want to evaluate the effect of a magnetic field on the absorption and on the primer of the energy emission***

*******We have indication that the phenomenon takes place at the surface of the sample; we have seen in previous experiments a transmutation effect => we want to evaluate the residue by means of SEM-EDAX and SIMS technique***

********As already done in previous experiments, we want to investigate the decay of the samples extracted from the 4 cells (about 2 months) and the particle emissions by means of a Ge and Si detector and Wilson chamber***



400
350
300
250
200
150
100
50
0
Counts
500
550
600
650
700
750
800
850
900
950
1000
Channel
511 KeV
583 KeV
609 KeV


609 KeV
511 KeV
583 KeV
300
250
200
150
100
50
Counts
600
650
700
750
800
850
Channel