PROGRESS IN ELECTROLYSIS EXPERIMENTS AT ENERGETICS TECHNOLOGIES

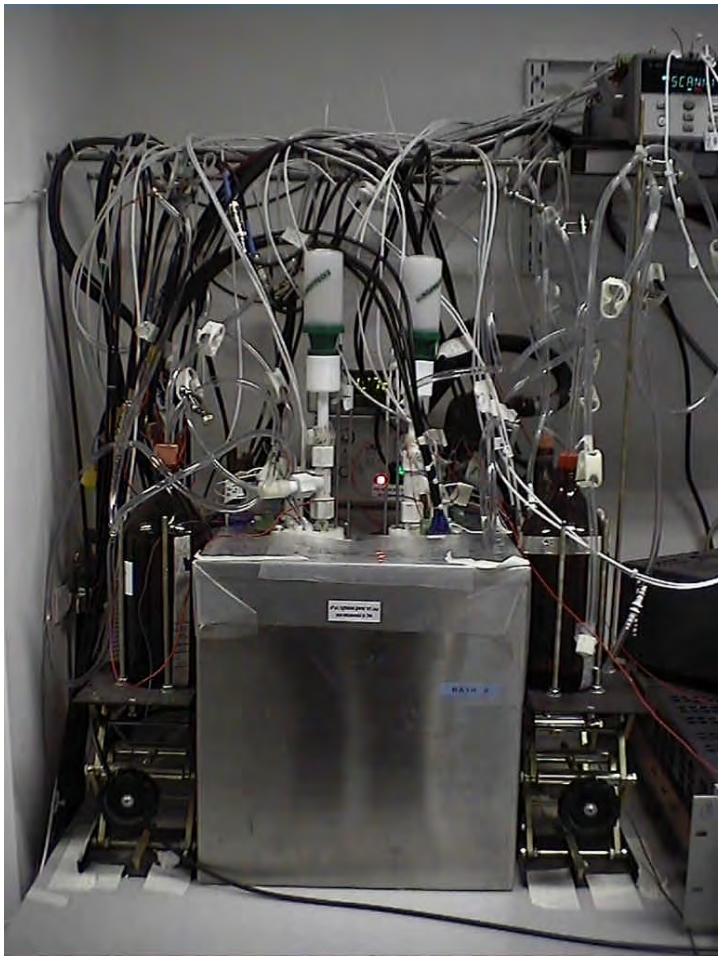
I. Dardik, T. Zilov, H. Branover, A. El-Boher, E. Greenspan, B. Khachaturov,
V. Krakov, S. Lesin and M. Tsirlin
Energetics Technologies
P.O. Box 3026
Omer Industrial Park
Omer, Israel
E-mail: lesin@energetics.il.co

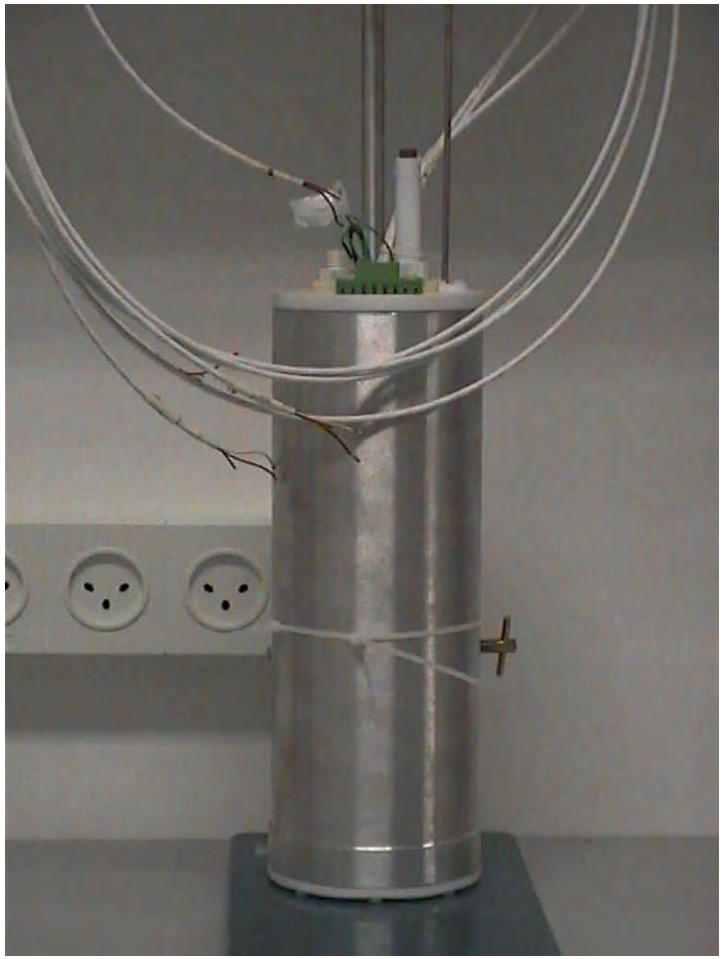
Presented at the
12th International Conference on Condensed Matter Nuclear Science
November 27 – December 2,2005
Yokohama, Japan

ABSTRACT

- In the last year we have succeeded obtaining significant Excess Heat (≥100%) with seven different Pd foils, using Electrolytic cells, excited by Dardik's Super Wave©.
- Several of the successful foils were provided by Dr. Vittorio Violante of ENEA Frascatti.
- Significant Excess Heat: The output power exceeded the input power (COP) by at least 100%. Maximum COP obtained is 600%, it lasted for 24.5 hours. The longest period of Excess Heat obtained was 134 hours at COP of 150%.
- A new type of experiments was initiated. Electrolytic loaded Pd cathode is exposed to Ultra Sonic waves (US), inducing cavitations in the vicinity of the cathode.
- It was found, that when the US induced cavitation is super-imposed on electrolytic loading of Pd cathode, excited by Dardik's Super Wave©, the load factor (D/Pd) is significantly higher.
- In 4 out of 6 experiments with electrolytic cells exposed to US, strong Excess Thermal effect was observed.
- Electron-microscopy analysis has shown that the ultrasonic wave resulted in formation of local structures of so-called "negative crystals". Selected targets are being analyzed using also TOF SIMS and dynamic SIMS.

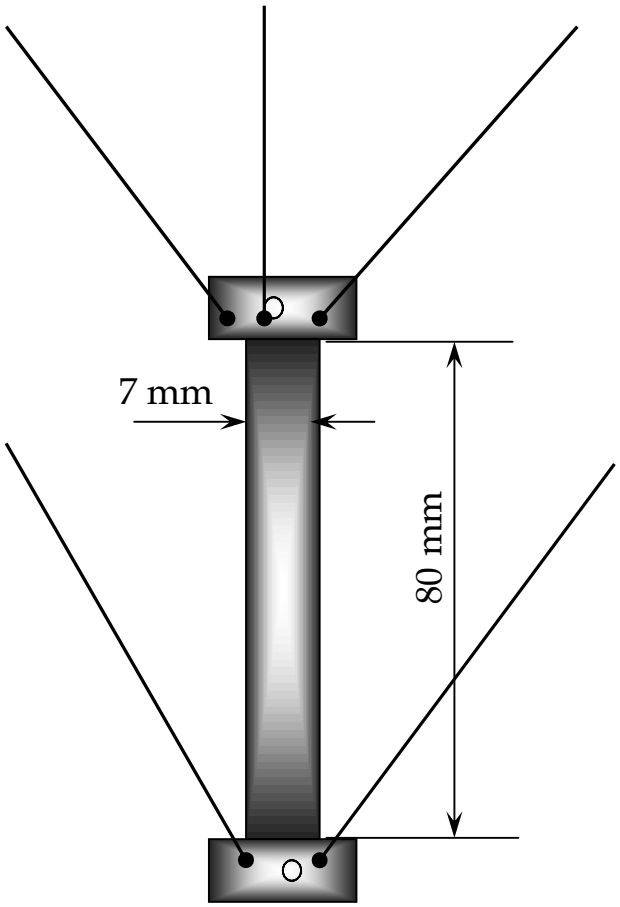
ELECTROLYTIC CELL





Electrolytic Cell and System Assembly

ELECTROLYTIC CELL



Target Description:

Pd foil 50 μm, prepared by Dr. Vittorio Violante (ENEA Frascatti, Italy) or home-made

Annealed at 870^0C in vacuum during 1h

Etched:

1) in Nitric Acid 65-67% 1 min
2) in Aqua Regia 1:1 water solution 1 min

Rinsed:

1) D_2O four times
2) Ethanol 95% twice
3) Ethanol Absolute once

Dried:

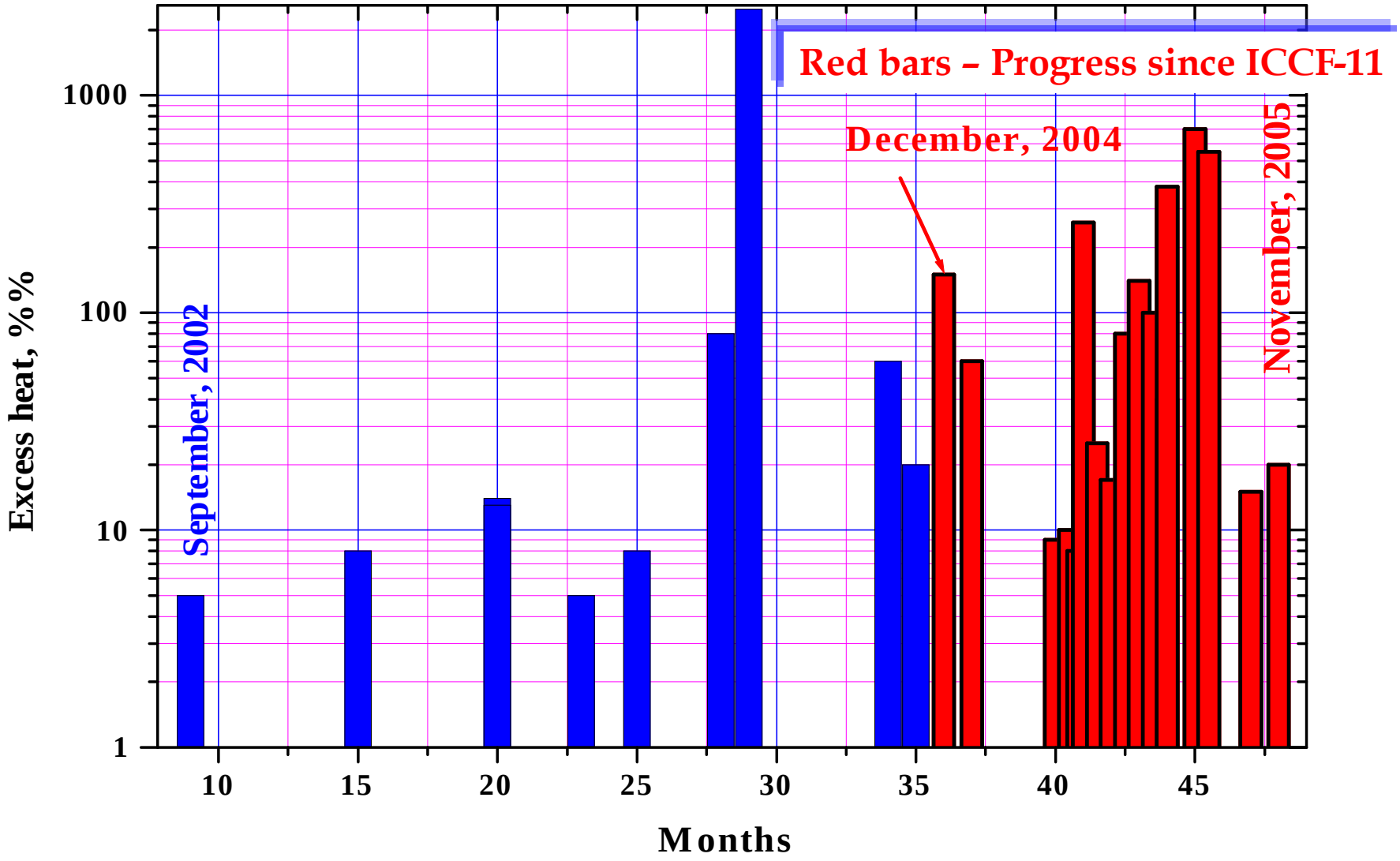
in vacuum at amb. temperature 24 h

Electrolyte:

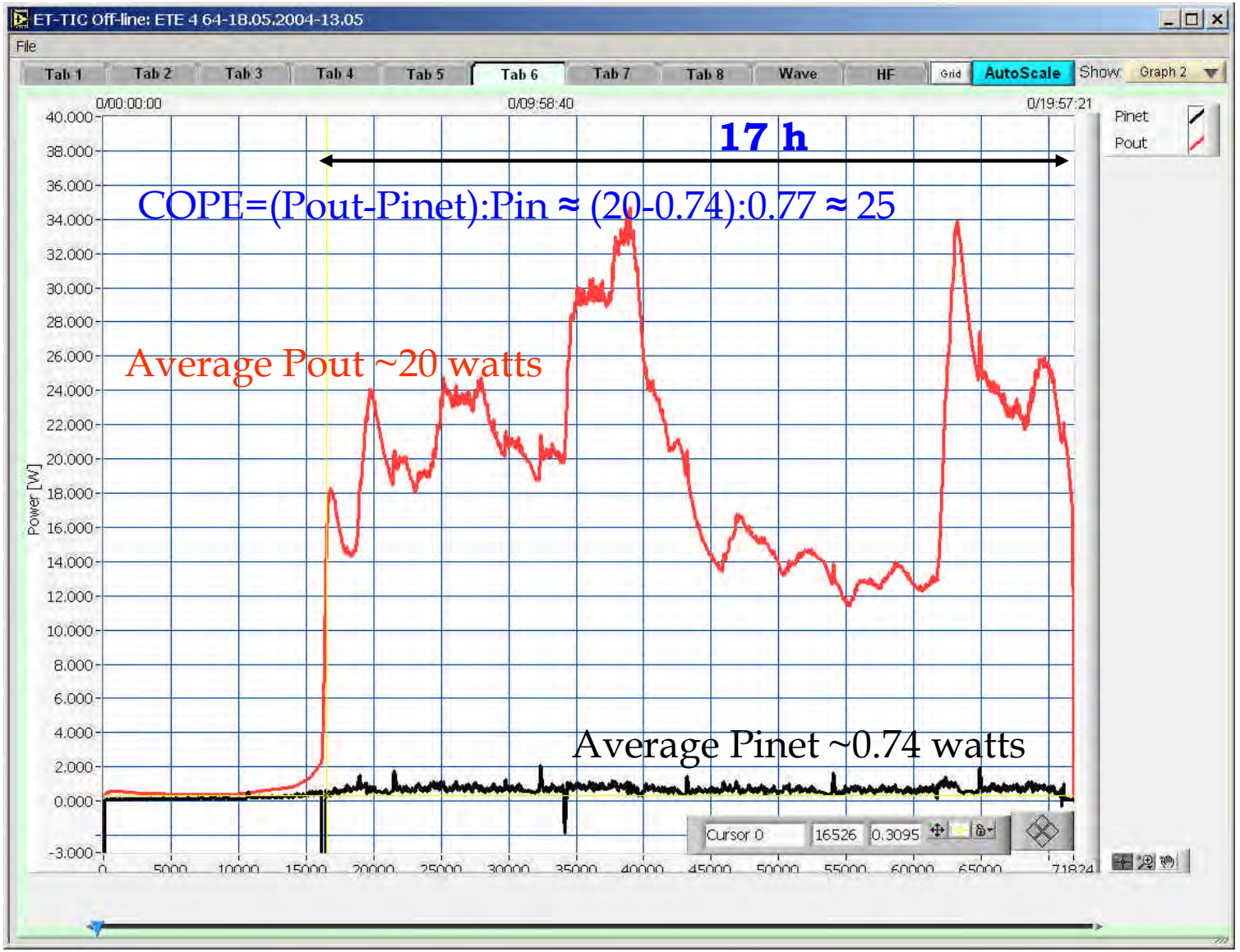
0.1M LiOD in D_2O Low Tritium Content 230 ml

Energetics Technologies Ltd., Israel

Cold Fusion Experiments

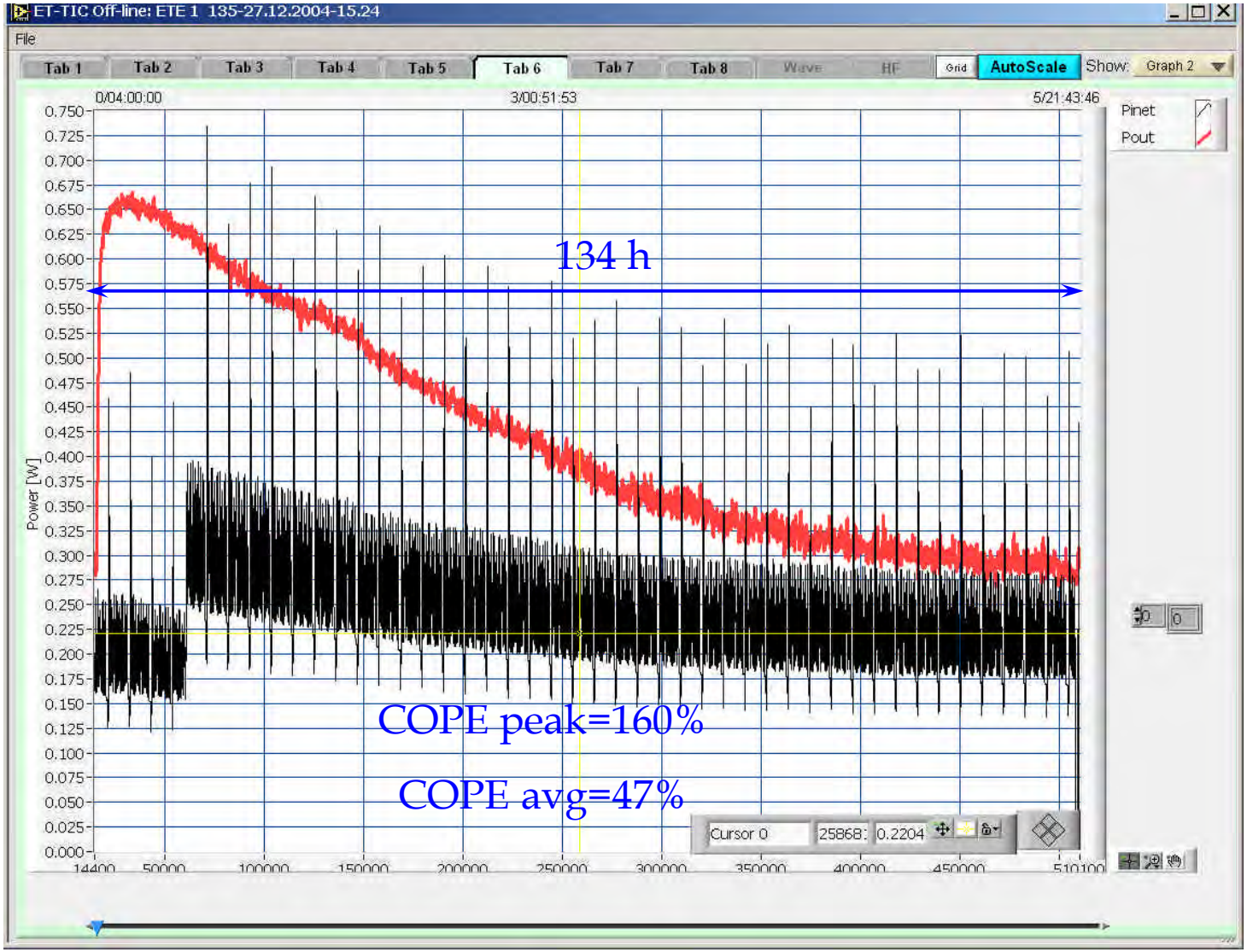


Excess Heat; Exp. # 64a

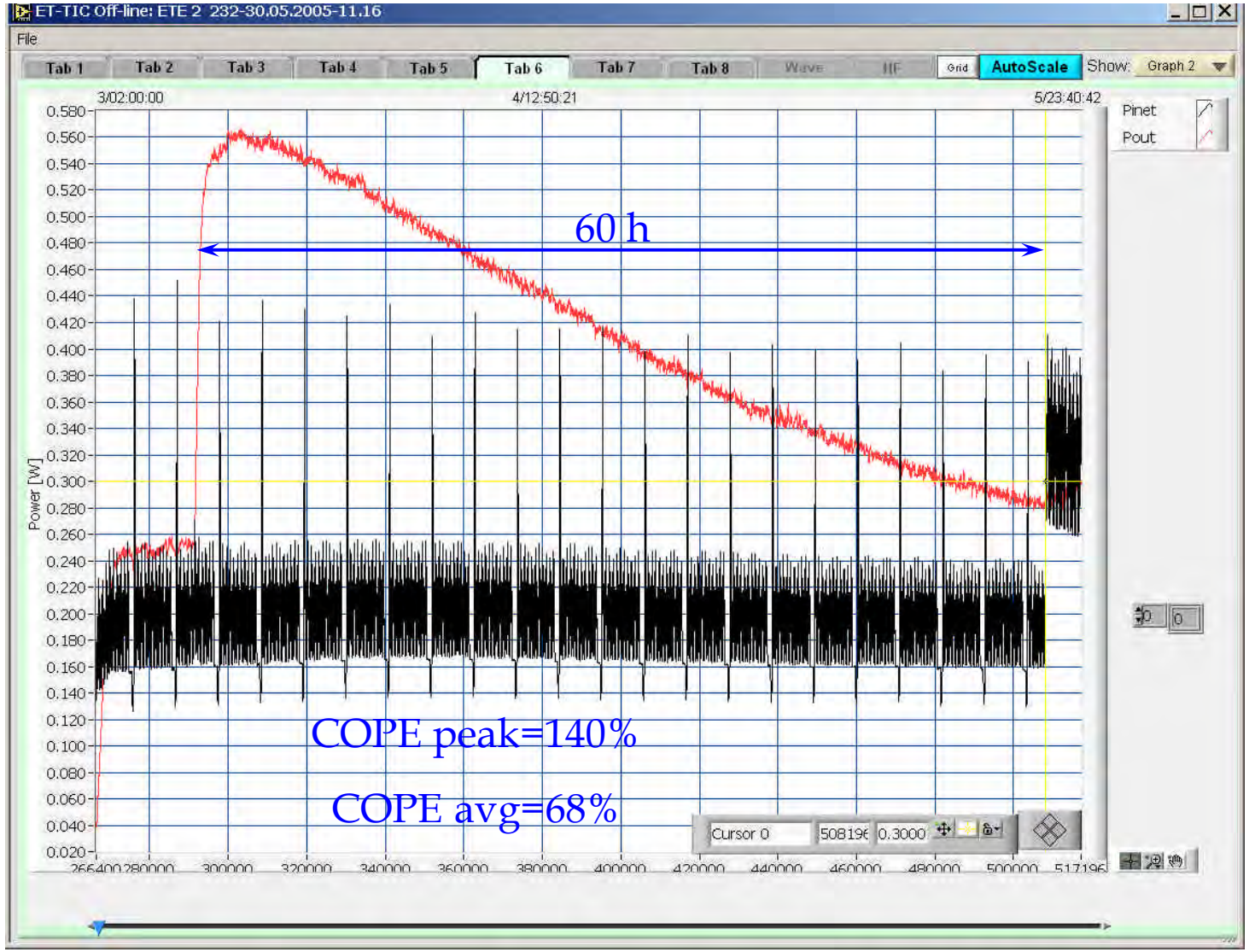


Excess Power of up to 34 watts; Average ~20 watts for 17 h

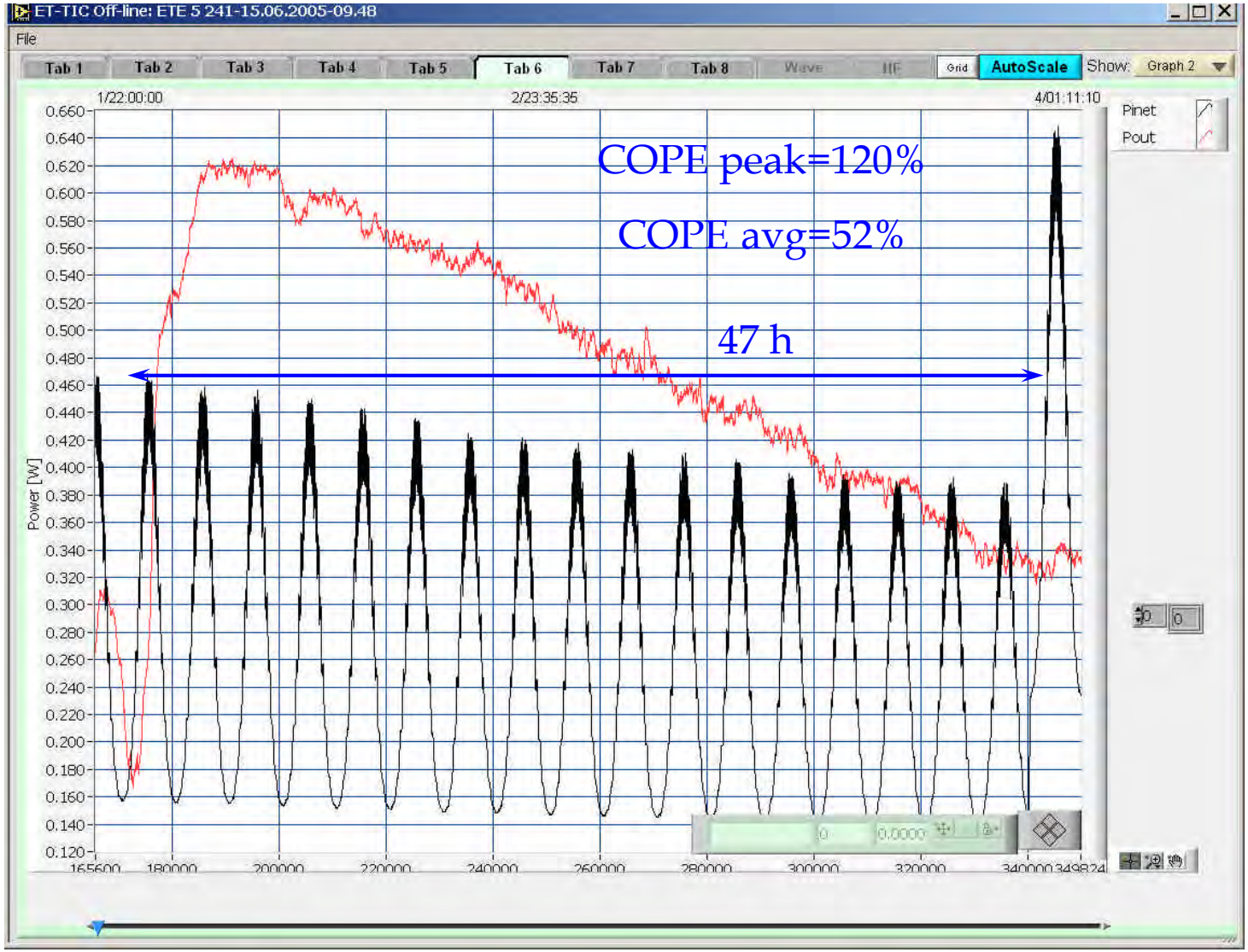
Excess Heat; Exp. # 135



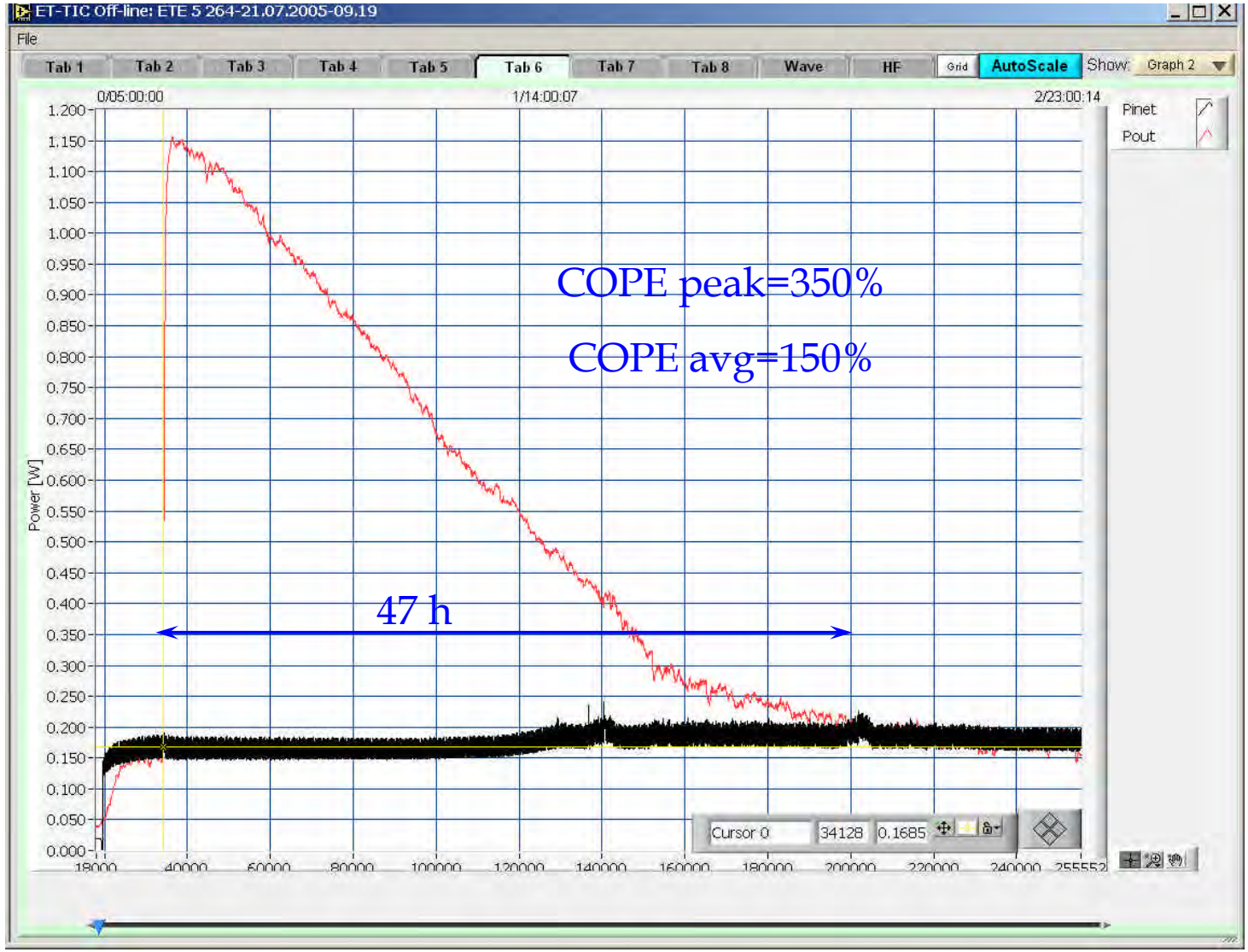
Excess Heat; Exp. # 232



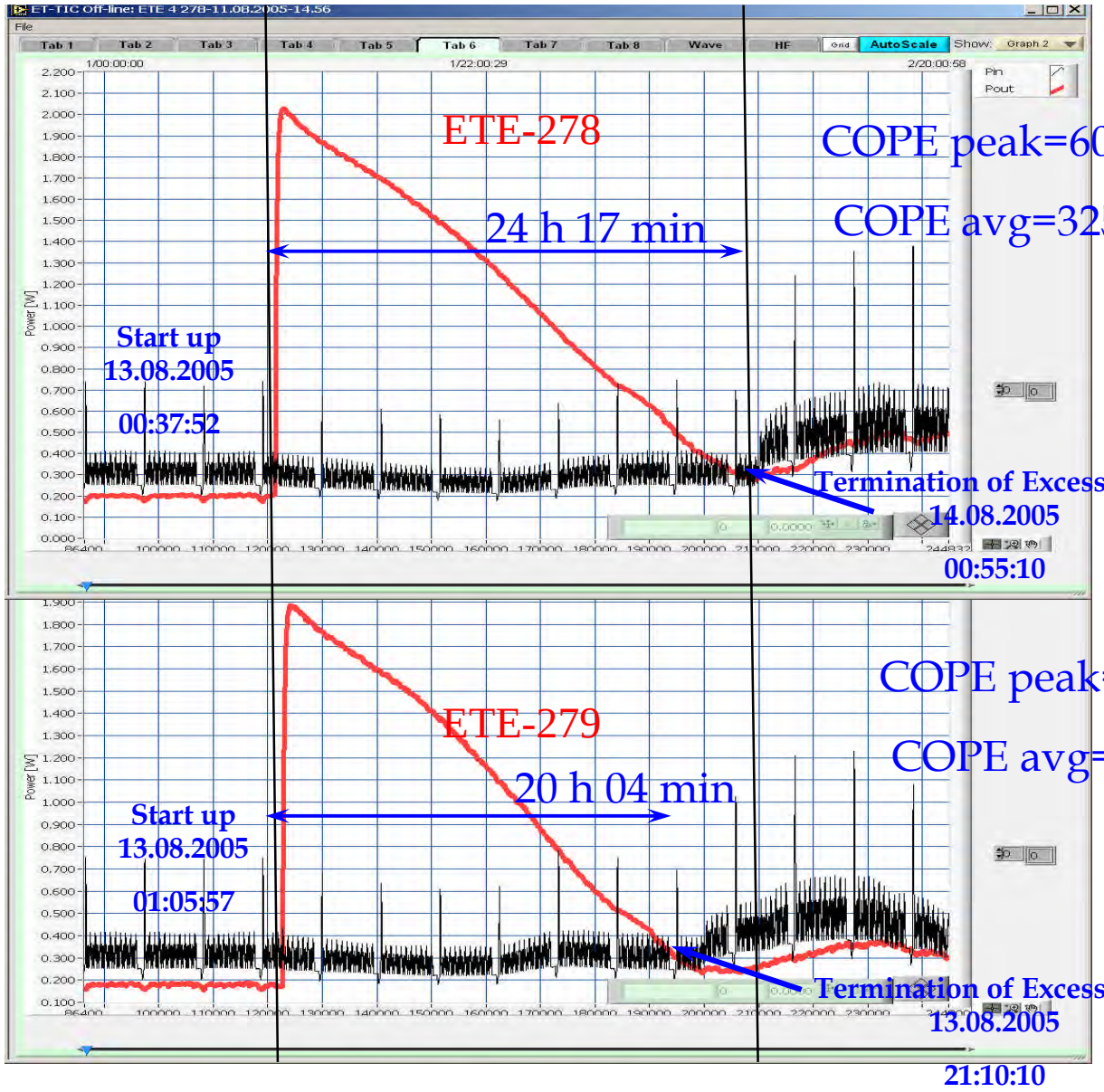
Excess Heat; Exp. # 241



Excess Heat; Exp. # 264

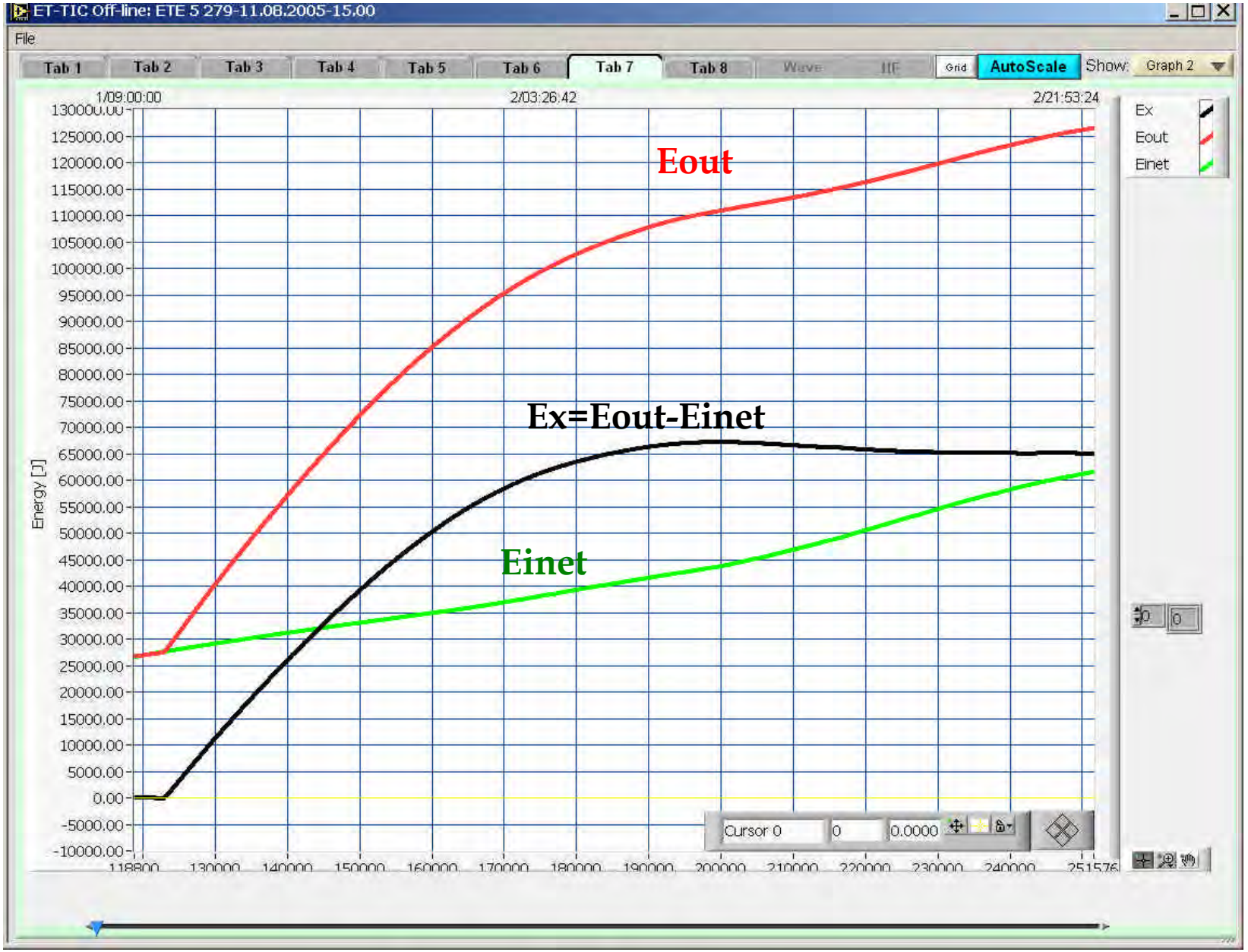


Excess Heat; Exp. # 278&279

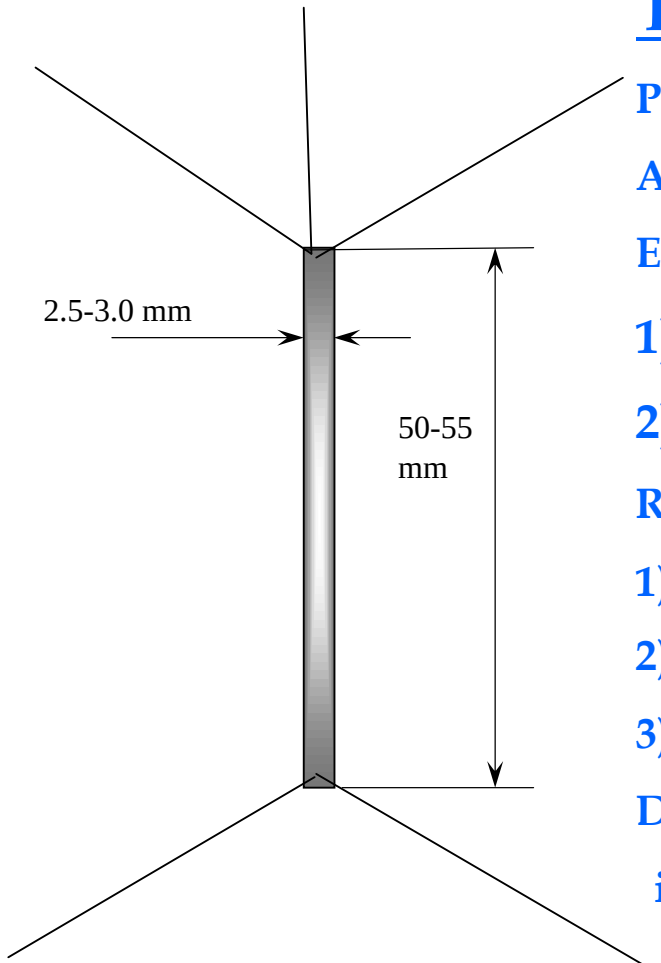


Simultaneous Excess Heat generation in two different experiments

Excess Energy; Exp. # 279



Ultra Sound – Electrolytic Cell



Target Description:

Pd foil 30-35 μm, prepared by rolling of 0.5 mm Pd wire

Annealed at 870^{0}C in vacuum during 1h

Etched:

1) **in Nitric Acid 65-67% 1 min**
2) **in Aqua Regia 1:1 water solution 1 min**

Rinsed:

1) **D_2O four times**
2) **Ethanol 95% twice**
3) **Ethanol Absolute once**

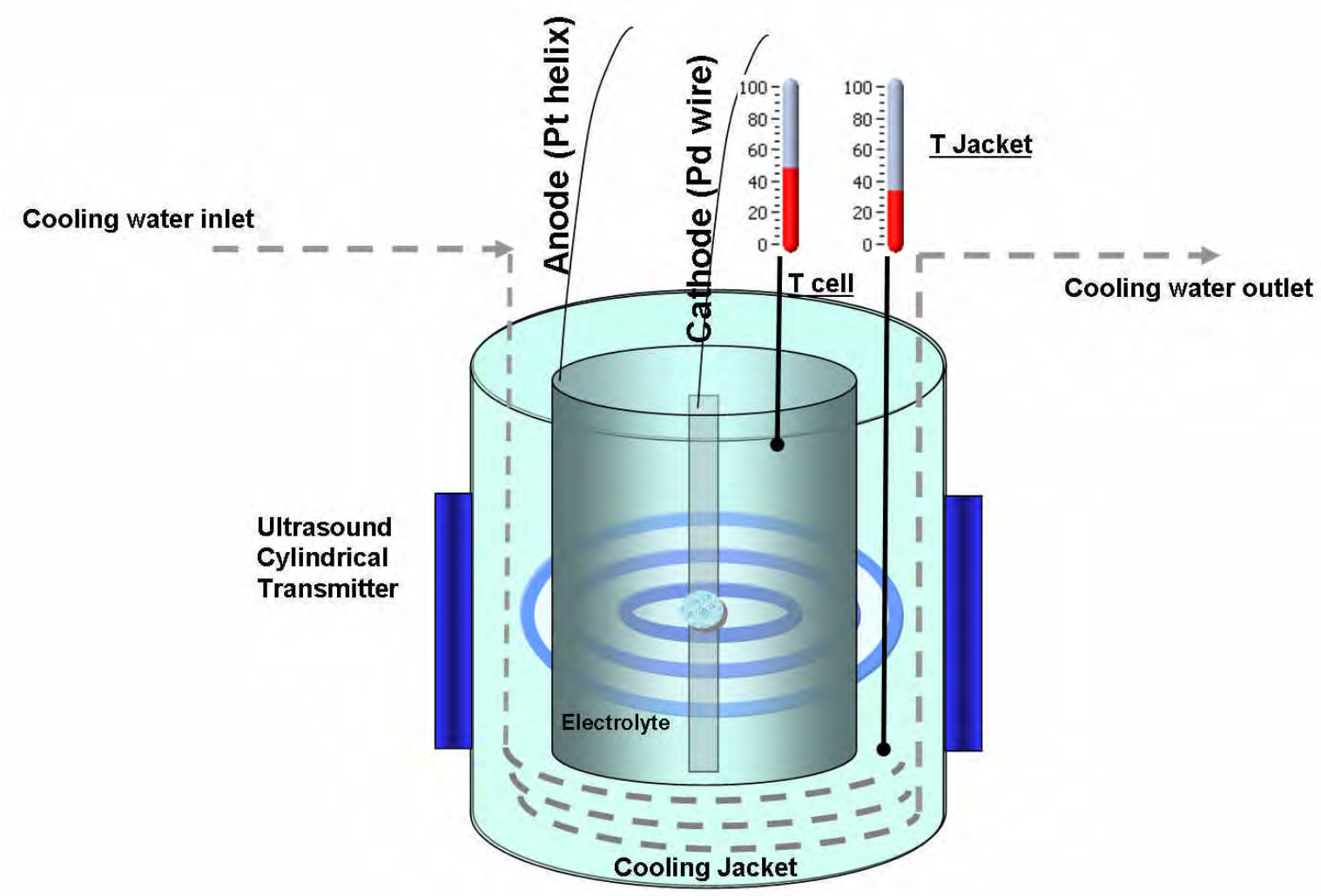
Dried:

in vacuum at amb. temperature 24 h

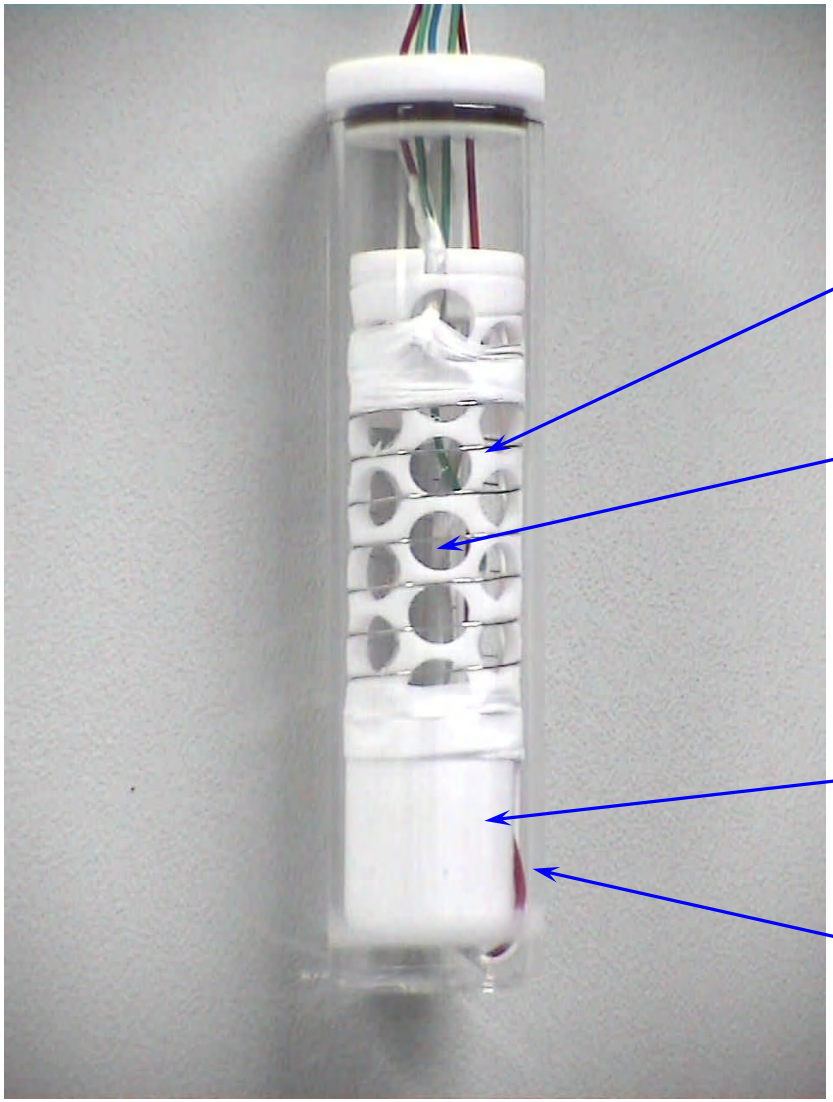
Electrolyte:

0.3M LiOD in D_2O Low Tritium Content 35 ml

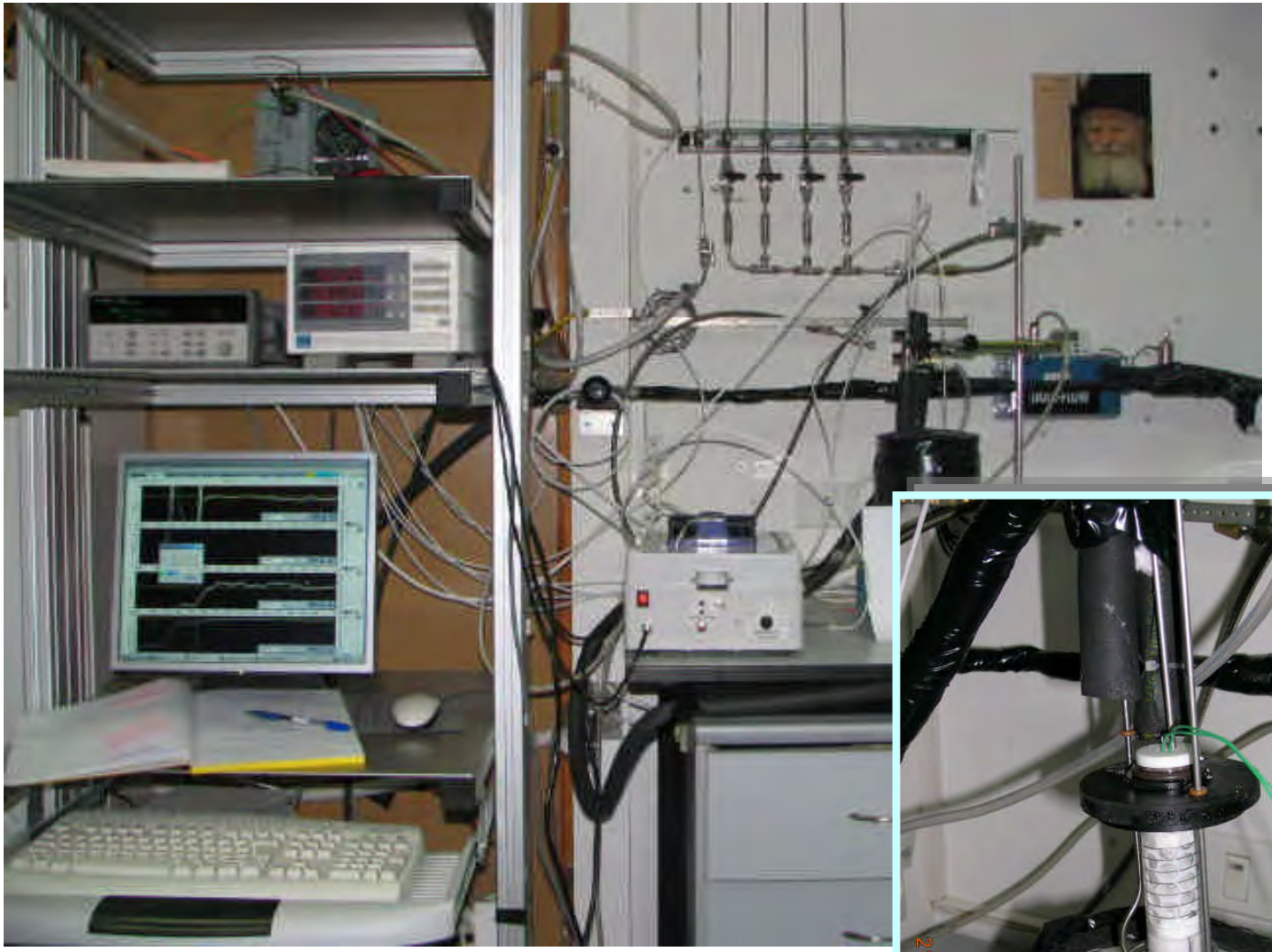
Ultra Sound – Electrolytic Cell Schematic View



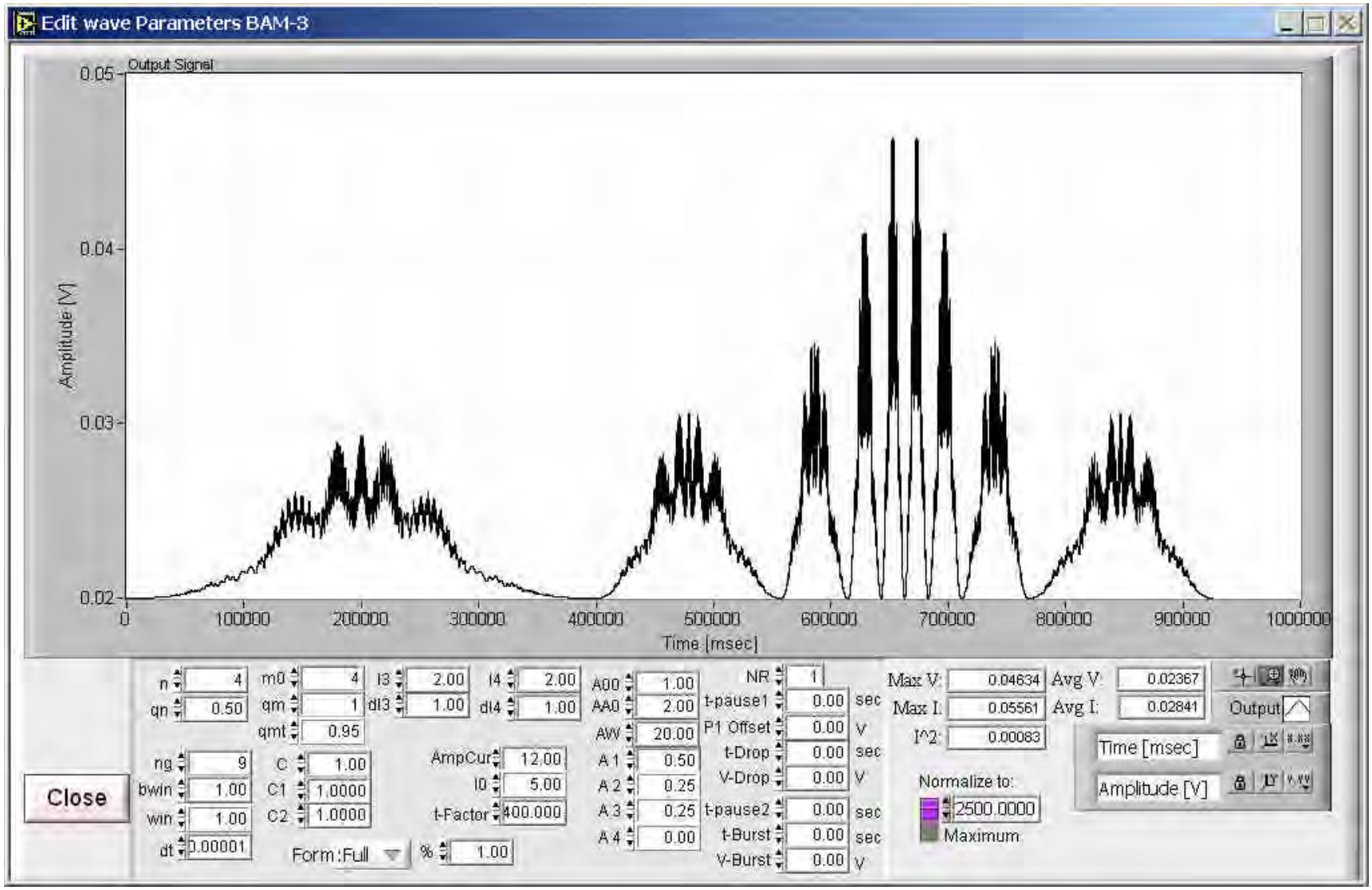
Ultra Sound – Electrolytic Cell



Ultra Sound – Electrolytic Cell Setup



Ultra Sound – Electrolytic Cell

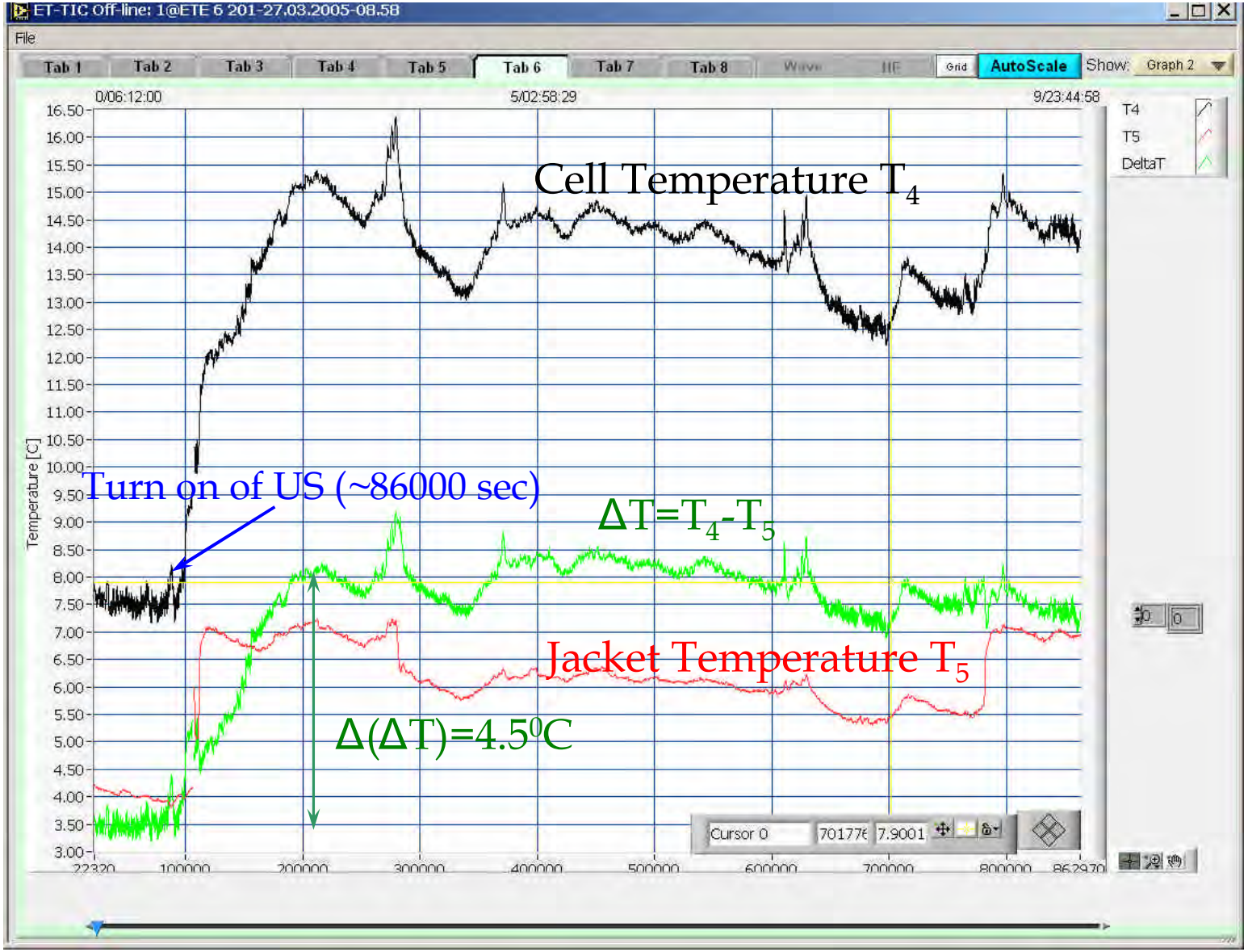


SuperWave applied in US experiment. Average current density J=11 mA/cm^2

Ultra Sound – Electrolytic Cell

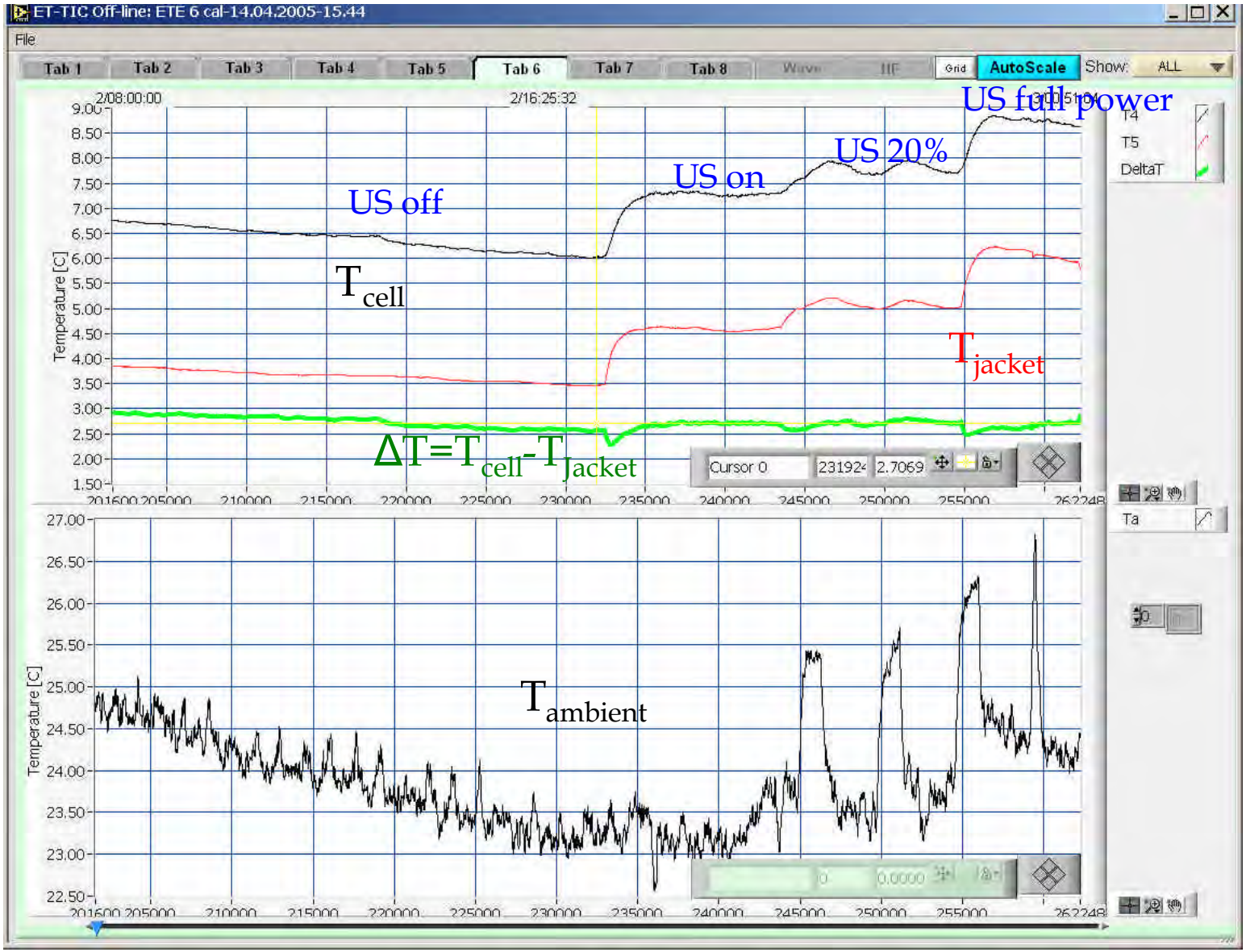
Relatively high loading achieved with low (11 mA/cm^2) current density

Ultra Sound – Electrolytic Cell #201 – strong Excess Thermal effect



Ultra Sound cell ETE -6-201 : $\Delta(\Delta T)=4.5^0C$

Ultra Sound – Electrolytic Cell Calibration with reference cell Pt - Pt



Estimation of US influence on temperature in the cell & jacket

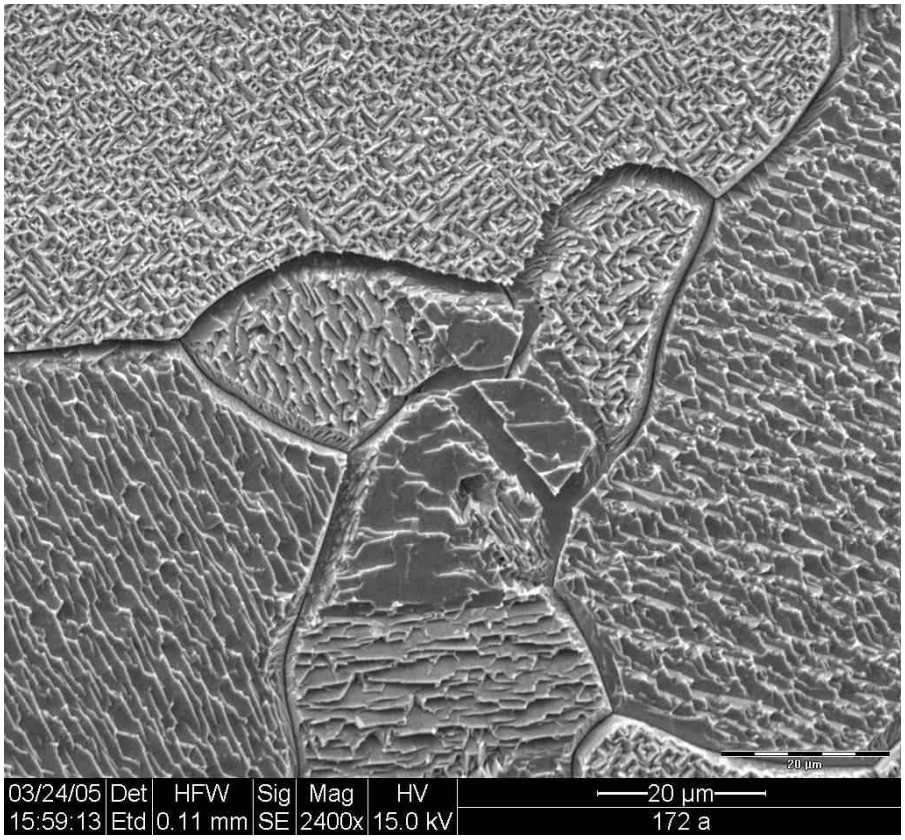
Ultra Sound – Electrolytic Cell

Summery of experimental results

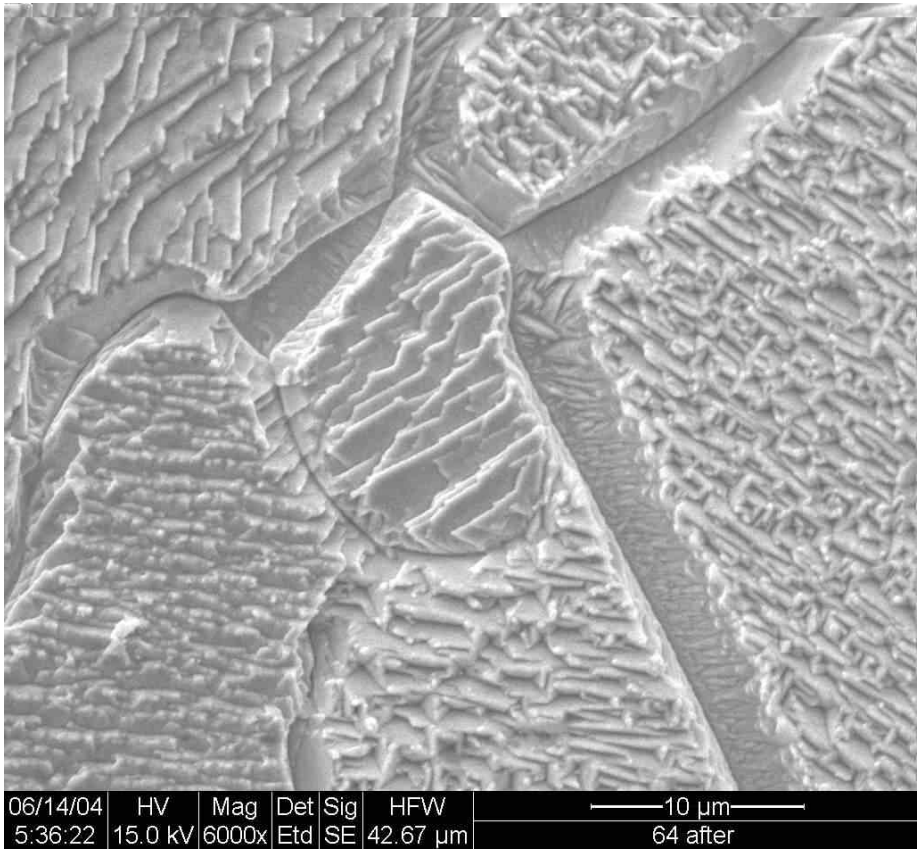
Order №	Experiment №	Starting Date	Duration of experiment	Temperature Gain,^{0}C	Estimated Excess Heat,%	Loading, D/Pd ratio	Remarks
1	**92**	23.09.04	7 weeks	1.5	75-80	>0.95	
2	155	26.01.05	8 days	-	-	~0.7	Poor loading
3	**201**	22.03.05	4 weeks	4.5	250-300	>0.95	
4	**225**	02.05.05	5 weeks	1.5	75-80	>0.95	
5	**244**	08.06.05	4 weeks	0.5	25-50	>0.90	
6	260	10.07.05	5 weeks	-	-	>0.95	

Reproducibility 66%: 4 of 6 experiments

Pd surface after loading



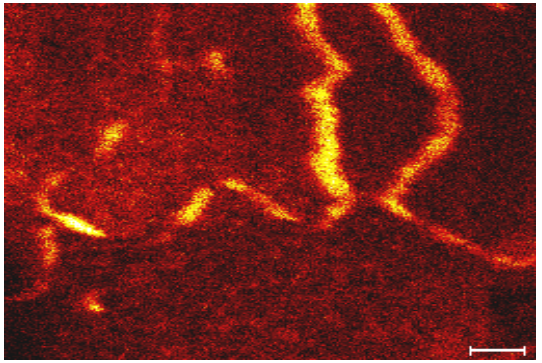
No.172 – no Excess Heat



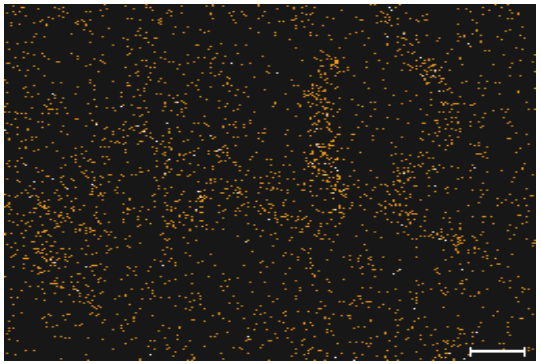
No.64 – strong Excess Heat

SIMS images of some isotopes distribution on Pd sample #64

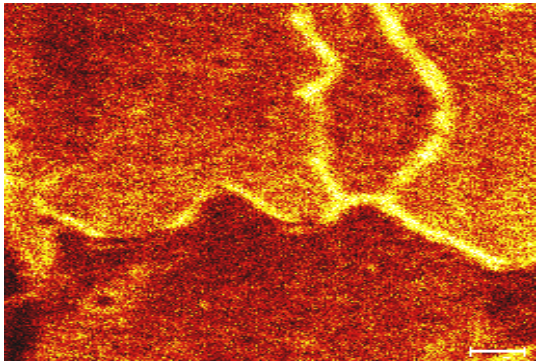
Wolfson Applied Materials
Research Centre
Tel Aviv University



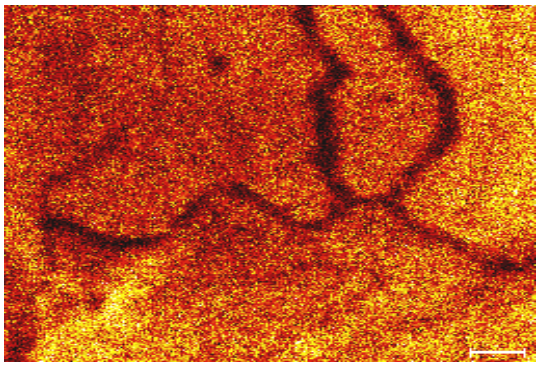
H - 1.01
Cts: 290213; Max: 32; Scale: 10µm



îH - 2.01
Cts: 2712; Max: 3; Scale: 10µm

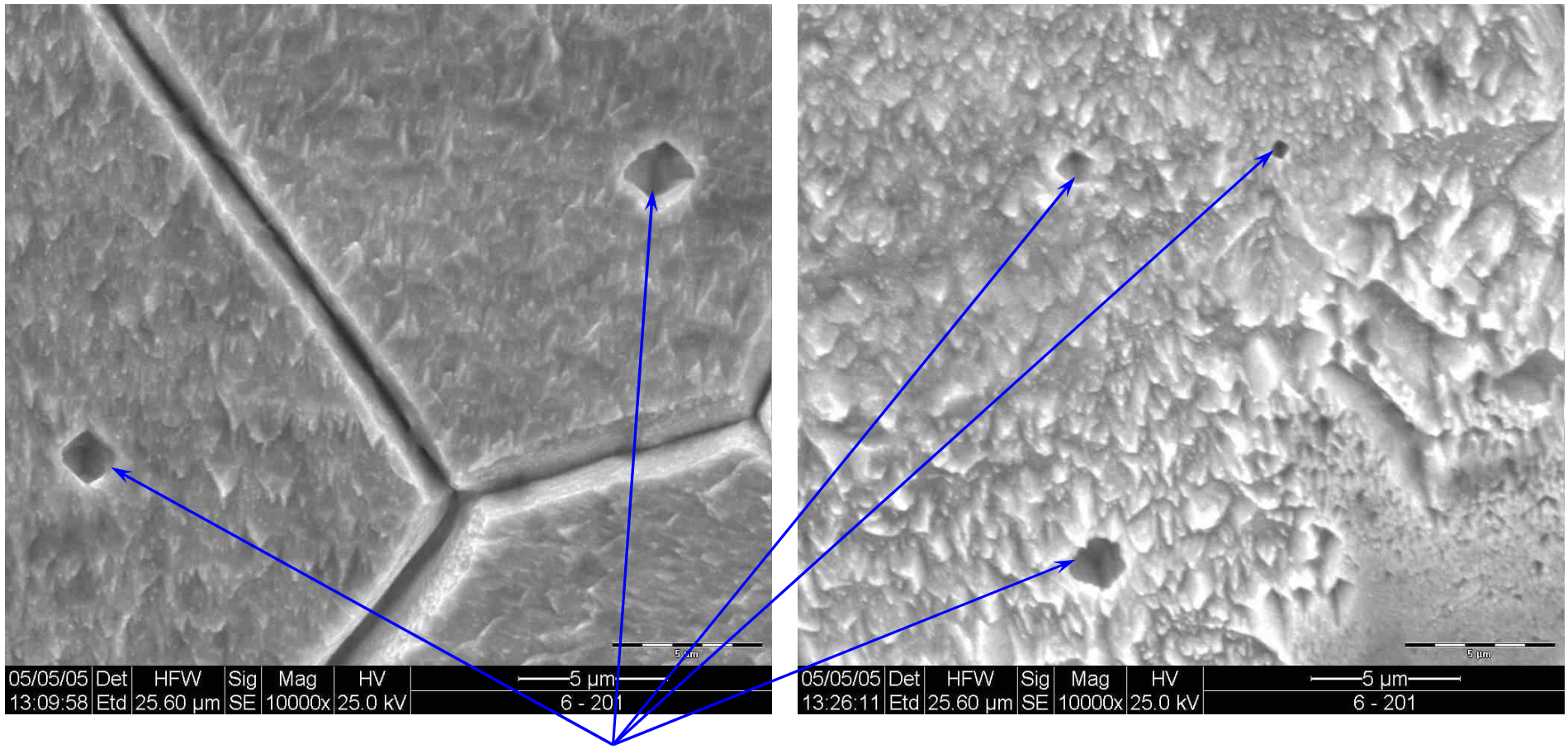


C - 12.00
Cts: 451582; Max: 26; Scale: 10µm



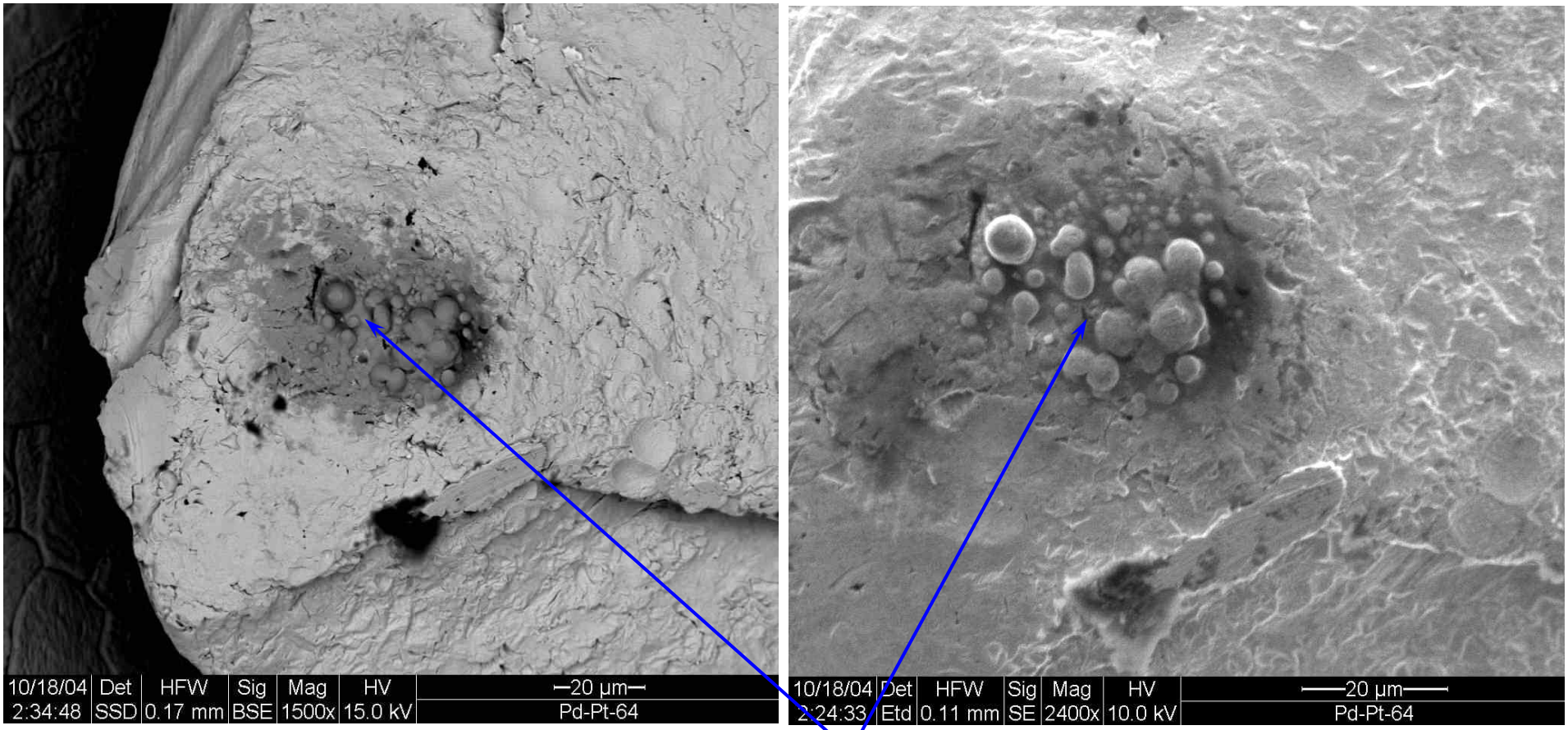
Pt - 194.96
Cts: 317895; Max: 17; Scale: 10µm

Pd foil No. 201 after Electrolytic-US loading



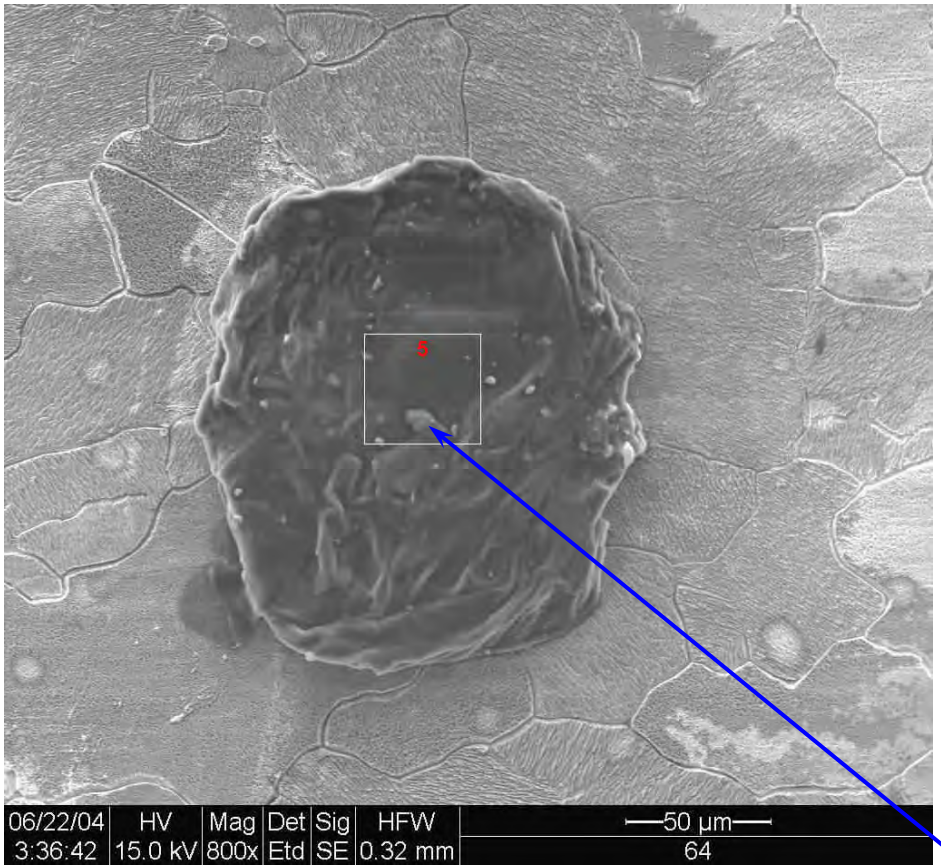
Cavitation tracks (half-octahedral shape negative crystal) on cathode surface after strong Excess Heat generation

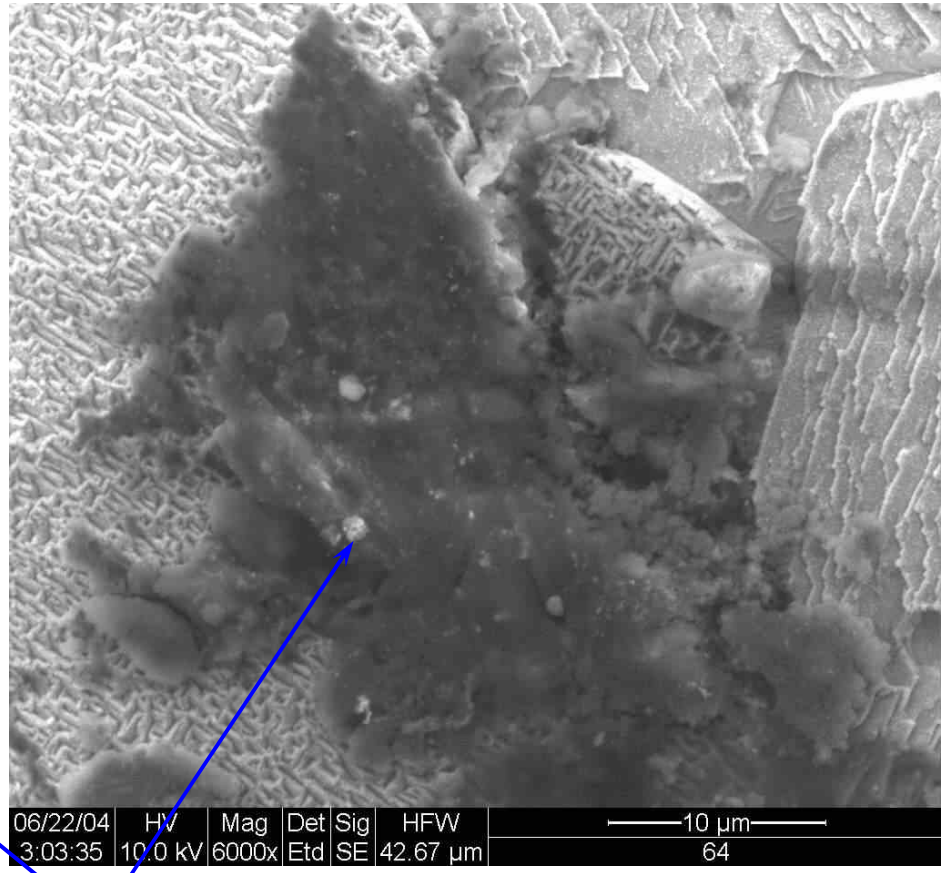
Sample #64, Pd globes on Pt leads after strong Excess Heat generation



Pd globes

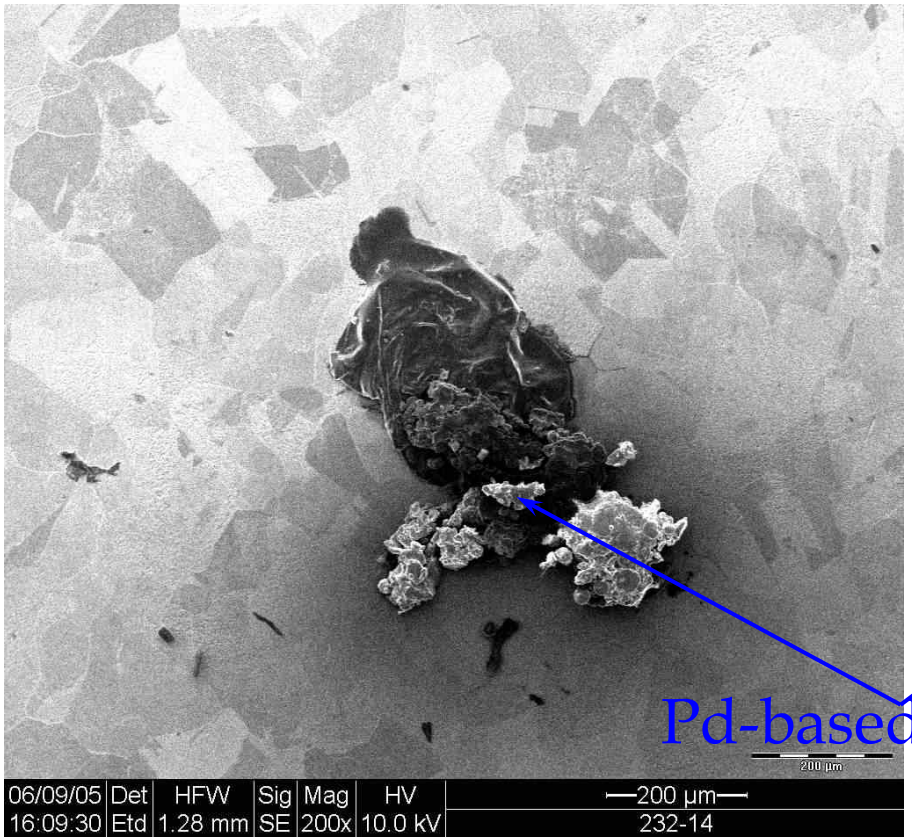
Sample #64, Pd-based globes on "Black Spots" after strong Excess Heat generation

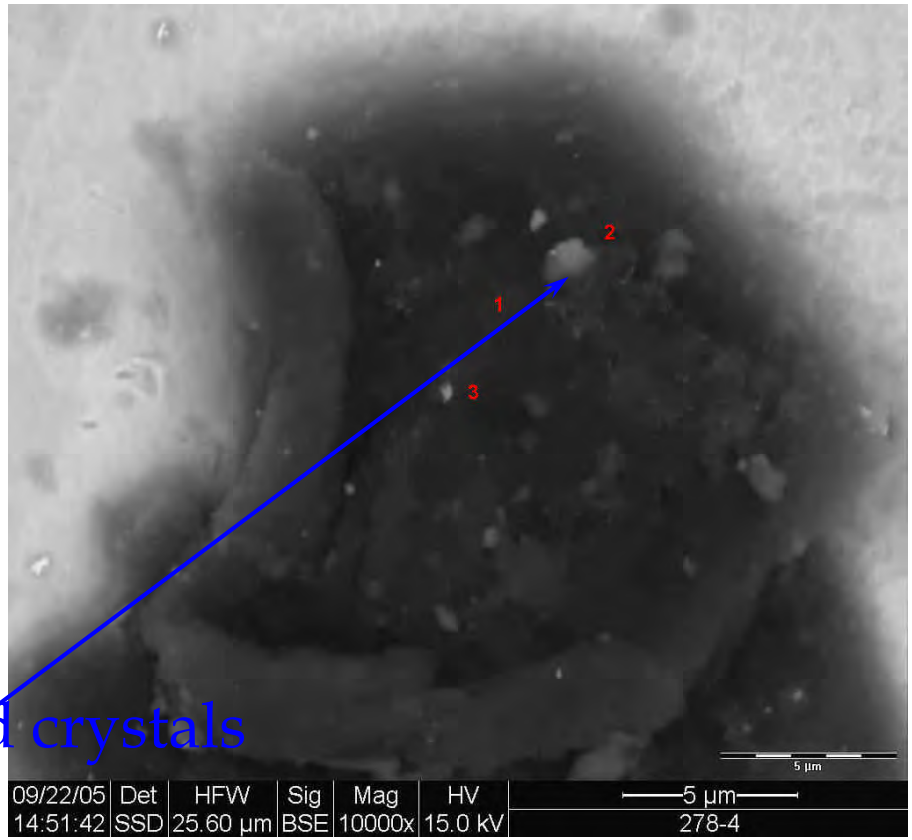




Pd-based globes

Samples #232 & 278, Pd-based global & dendritic crystals on "Black Spots" after strong Excess Heat generation



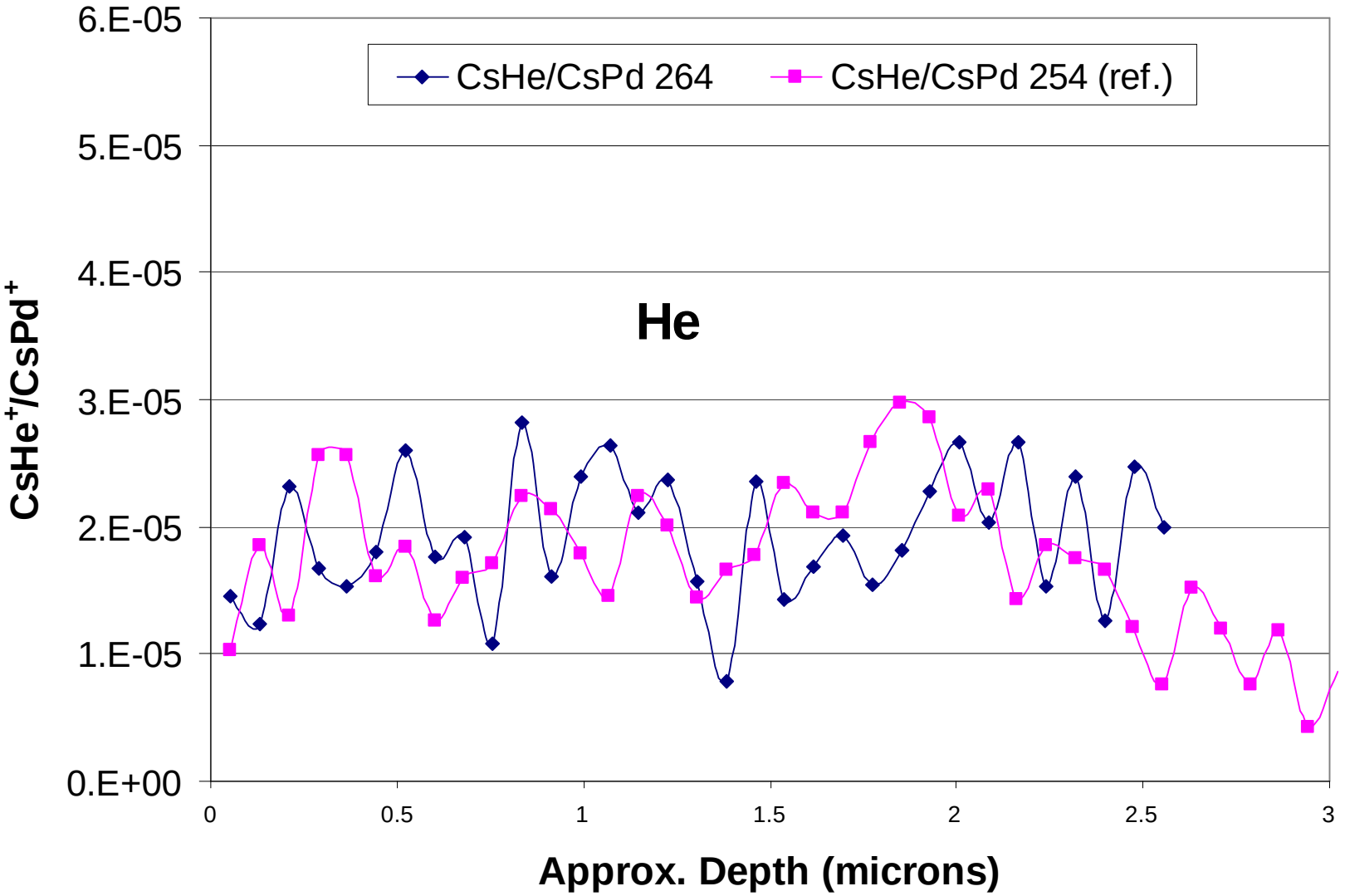


Pd-based crystals

140% of Excess Power

600-700% of Excess Power

4He content in Pd after electrolysis resulted in strong Excess heat generation (264) and virgin Pd as reference (254)



CONCLUSIONS

- In the last year we improved our Electrolytic cells reproducibility rate. We achieved significant Excess Heat (>100%) with seven different Pd foils which were excited by Dardik's SuperWave©.
- A new type of experiments was initiated – electrolytic loading of Pd, exposed to Ultra Sonic (US) waves.
- US waves are inducing cavitations in the vicinity of the Pd cathode whereas Pd cathode is electrolytic excited by Dardik's SuperWave©.
- Using a combination of US and Dardik's SuperWaves© gives:

a) A significantly higher load factor values

b) Formation of local structures of so called "negative crystals" (shown by electron microscopy analysis)

c) A reproducibility rate improvement (66%)

- The achieved promissing qualitative experimental results require accurate calorimetry which is underway.

CONCLUSIONS (continuation)

- Analysis of Pd samples after generation of Excess Heat show the presence of Pd crystals and globs in the vicinity of "black spots"(active sites), which may be caused by local thermal bursts of high power density, resulted in an impressive intensification of Pd mass-transfer.
- We have not found out any products of nuclear transformation in the samples which gave Excess Heat effect.
- In order to achieve higher reproducibility rates the following has to be done:

a) Futher optimization of the SuperWaves© in combination with US

b) Thorough investigation of the controlling parameters of the Pd cathodes in order to achieve large amount of active sites.

ACKNOWLEDGMENT

We wish to thank Dr. Vittorio Violante and his group from ENEA FRASCATTI for their cooperation in preparation of the Pd cathodes.