

# CELANI REPLICATION

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MEMORIAL PROJECT

# Introduction

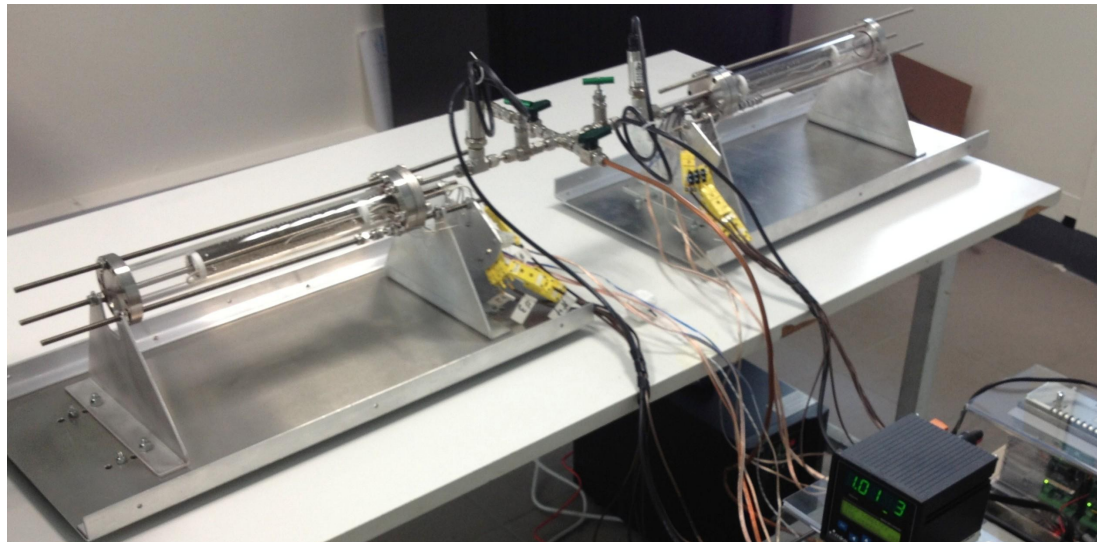
- ICCF17 gave birth to MFMP,
  - Messages we have heard/understood:
    - Need a lab rat experiment,
    - Needed to expose it to the world and legitimize the LENR field of science,
    - Need Exact Replications,
    - Celani's looked promising,
- => Replicate Celani's demo as first aim.

# Outline

- Analysis of the "loading",
- Q4-2012 early results,
- Q2-2013 vacuum tests,
- Characterisations,
- Excess Heat observations,
- Open questions, conclusions and future experiments.

# The Replicas

- In its third iteration, very close to the original,
- Two types of environments, one in an insulated box, the second in free air,
- 2 locations, 2 cells in each place, one is a dummy/control, the other is "active",



# Loading vs. Resistance

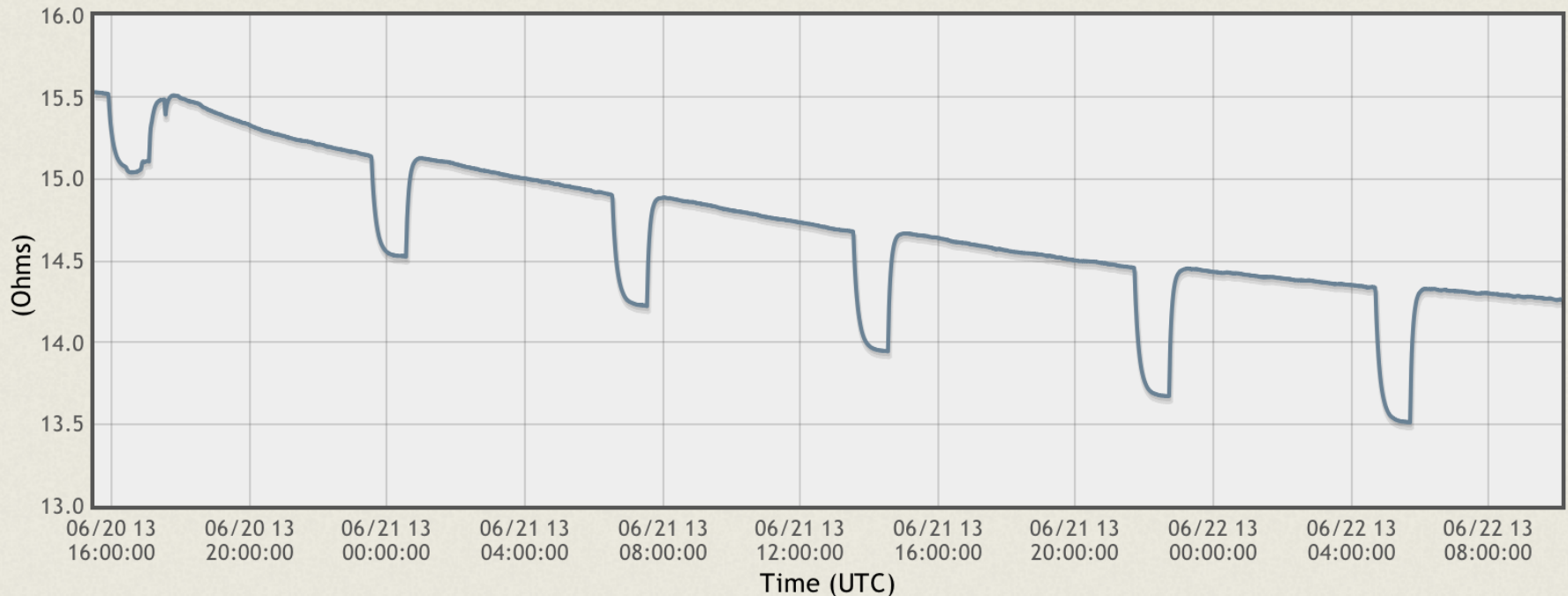
## View Test Cell EU1.3A

Export as CSV

Update with new data:

Period Length: 24 Hours

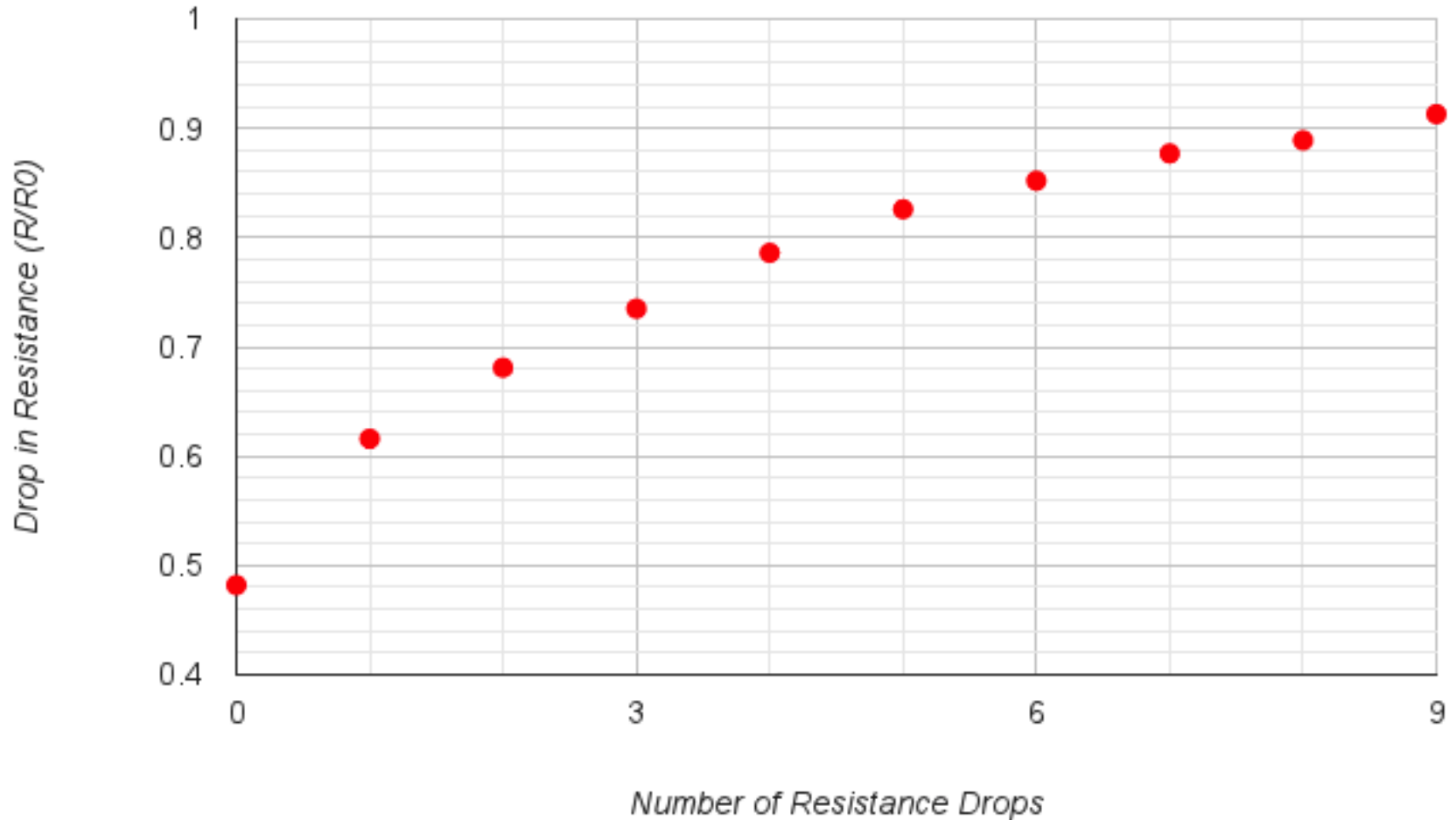
From 06/20/2013 15:30:00 To 06/22/2013 10:08:27 1 Minute Average Go



R1\_CuNi (Ohms)

# Loading vs. Resistance

Difference Between Hot and Cold Resistance During the Loading



# "Loading"?

- The most repeatable process,
  - 100% repeatable even on "toasted" wires,
  - Resistance loss up to 26%,
  - $R_0$  measurement is made when shipped but is different after heating in vacuum,
  - Is resistance drop really related to formation of nickel hydrides?

CMNS community **needs** a Baranowvski curve for hydrogen in nickel!

# Q4-2012, Early Results

- Very similar to the original, but not a complete replication,
- Commercial constantan used for calibration apparently became "active",
- Excess calculated between widely separated baselines,
- Confident on 6W of excess power for 48W input.

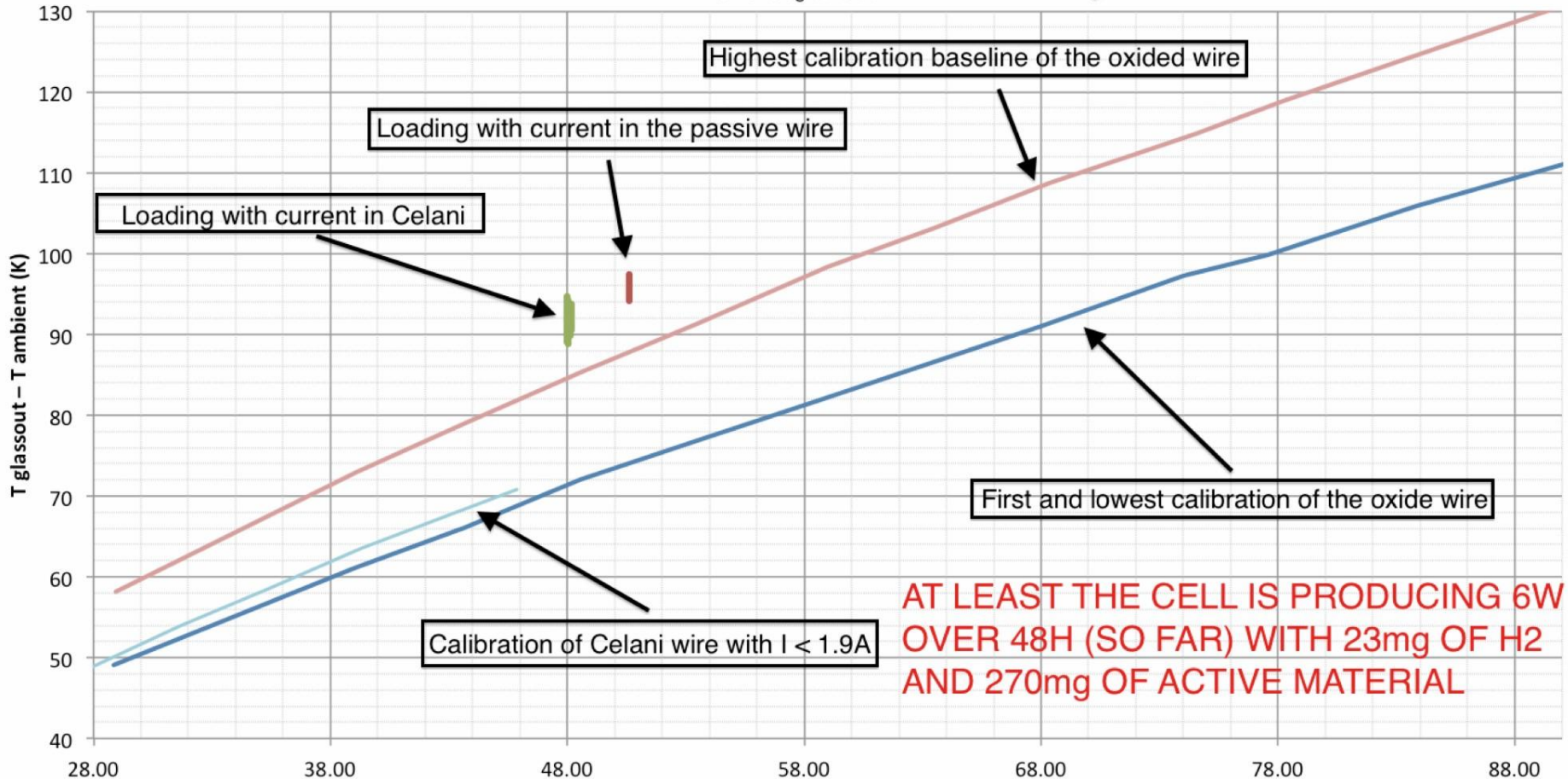
# Q4-2012, Early Results

Curve Legend: [Wire]-[Gaz]-P[pressure]

$$f(P \text{ in}) = \Delta T \text{ out}$$

CuNi44+Ox: Constantan 0.2mm w/ oxide coating  
 360L: Celani wire w/ 360 layers

— CuNi44+Ox-75H2-25Ar-P3.5   
 — CuNi44+Ox-He-P1   
 — 360L-He-P1   
 — 360L-H2-P1-PassiveLoading   
 — 360L-H2-P1-ActiveLoading  
 Chronological order  $\rightarrow$



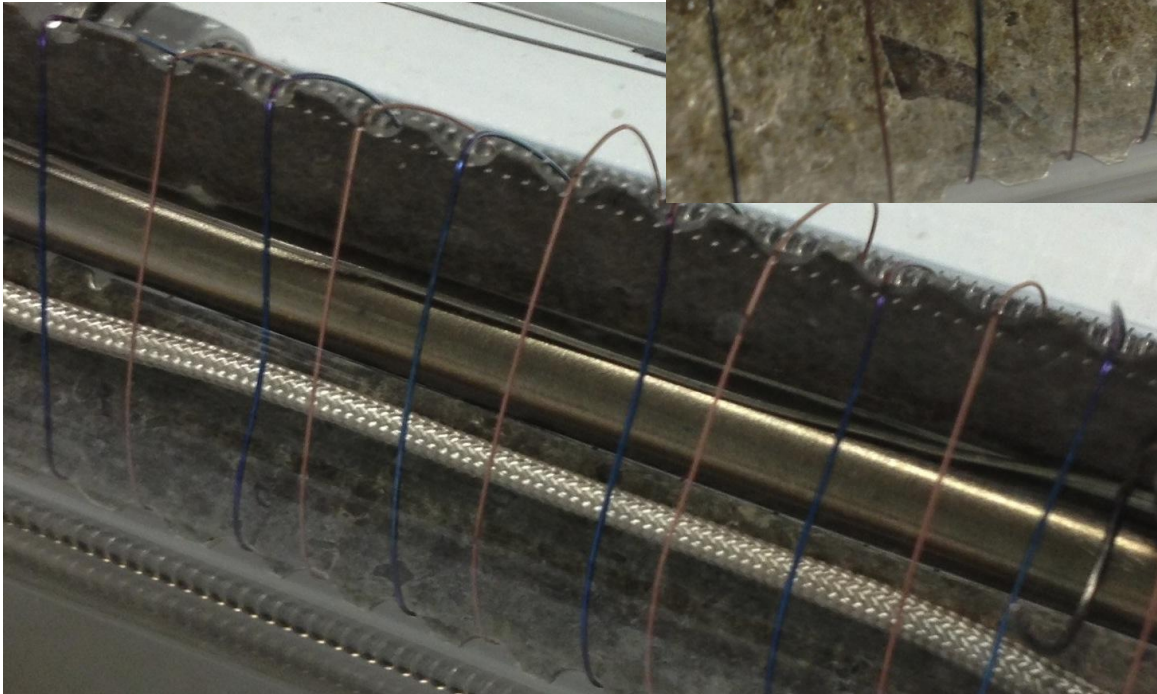
**AT LEAST THE CELL IS PRODUCING 6W OVER 48H (SO FAR) WITH 23mg OF H2 AND 270mg OF ACTIVE MATERIAL**

# Q2-2013, Vacuum Test

- Vacuum addressed a lot of questions
  - Variation of pressure, hence thermal conductivity,
  - difference between H<sub>2</sub> atmosphere and He or Ar during calibrations,
  - Higher temperature, S/N ratio better.
- Main drawbacks
  - Shorter operational duration
  - Dynamic oxidation? Yes!

# Chemical Effect?

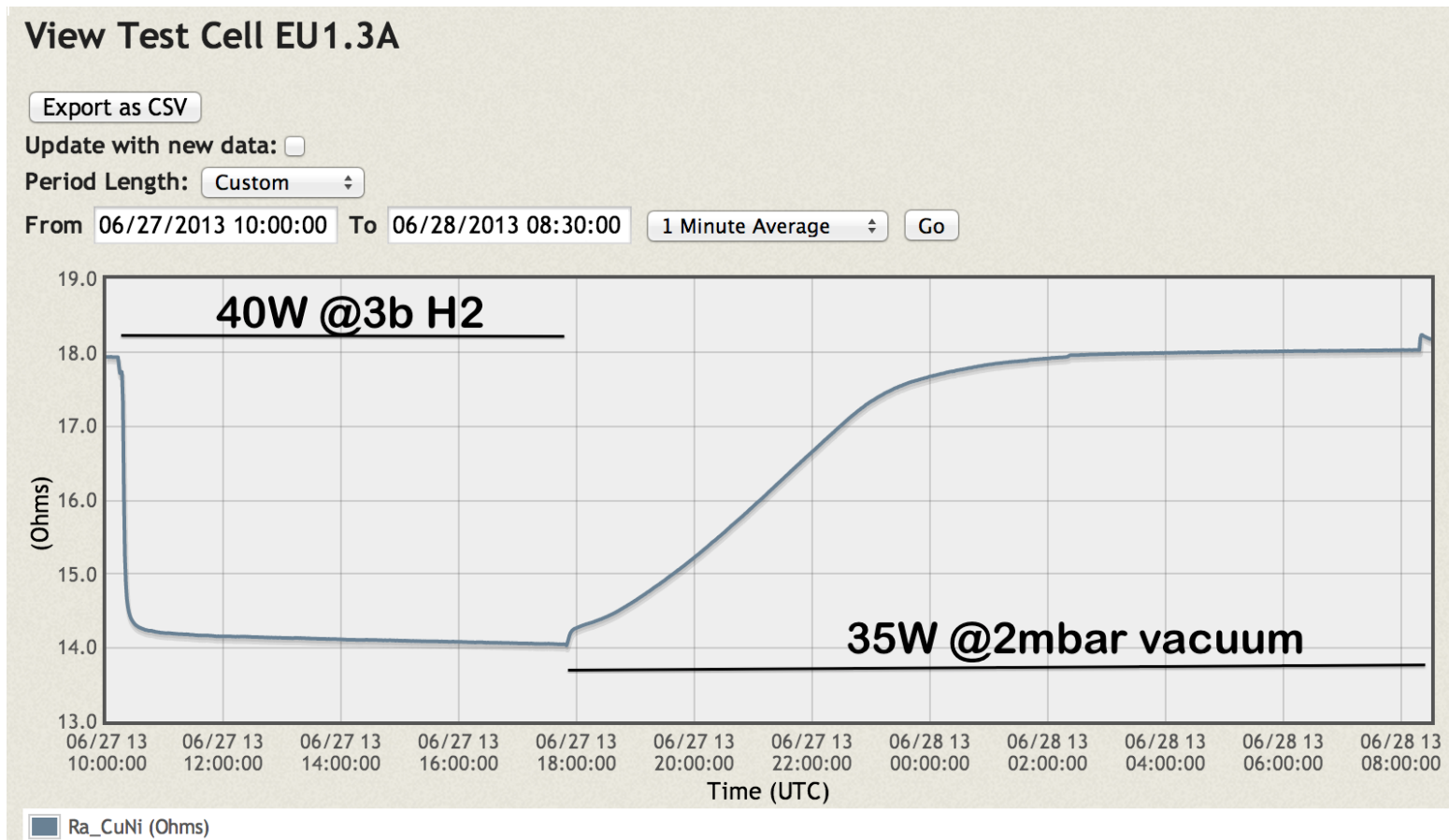
Below is after  
"loading",  
constantan has a  
copperish color



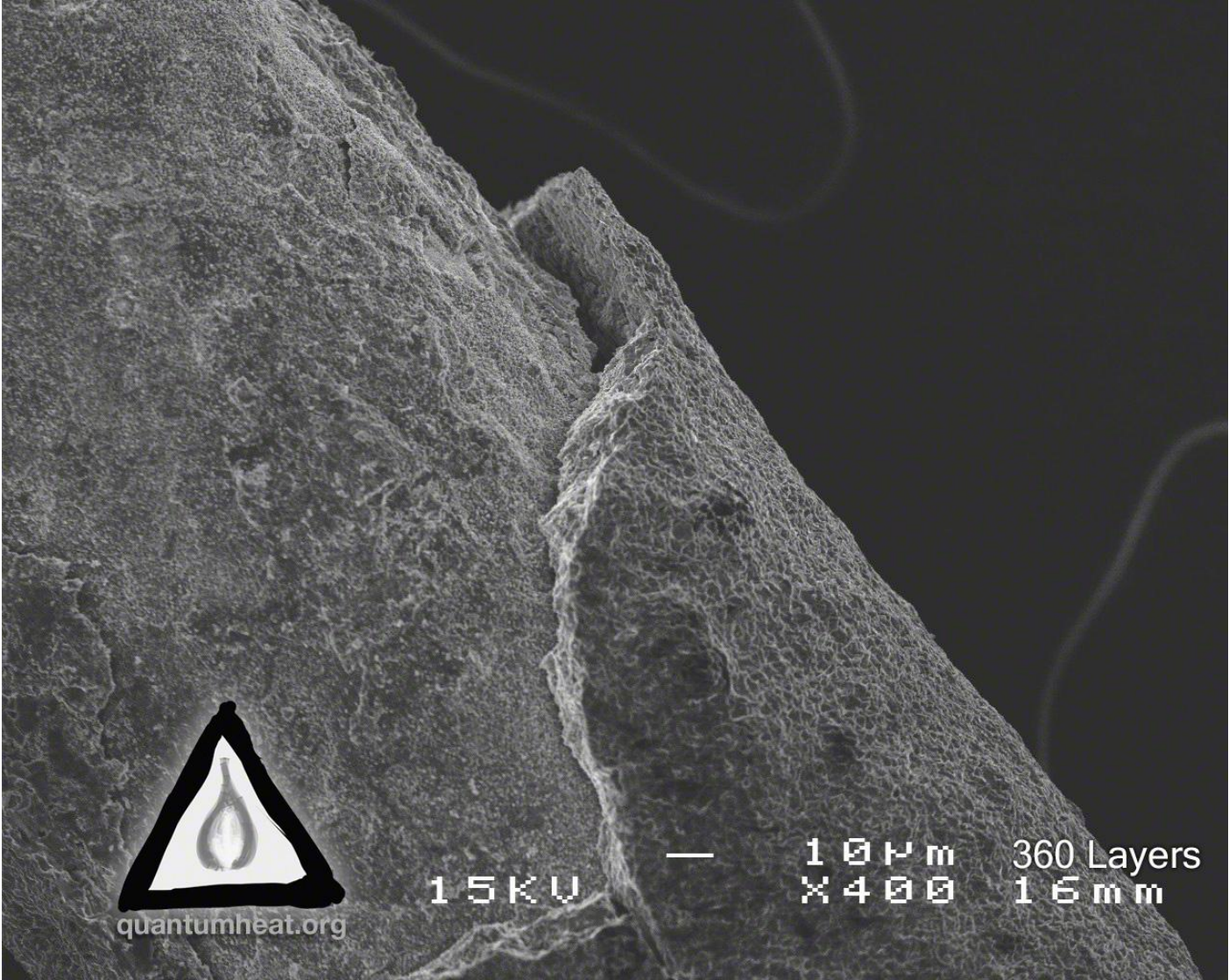
Above is after  
"deloading",  
constantan has a  
black color

# Cycles

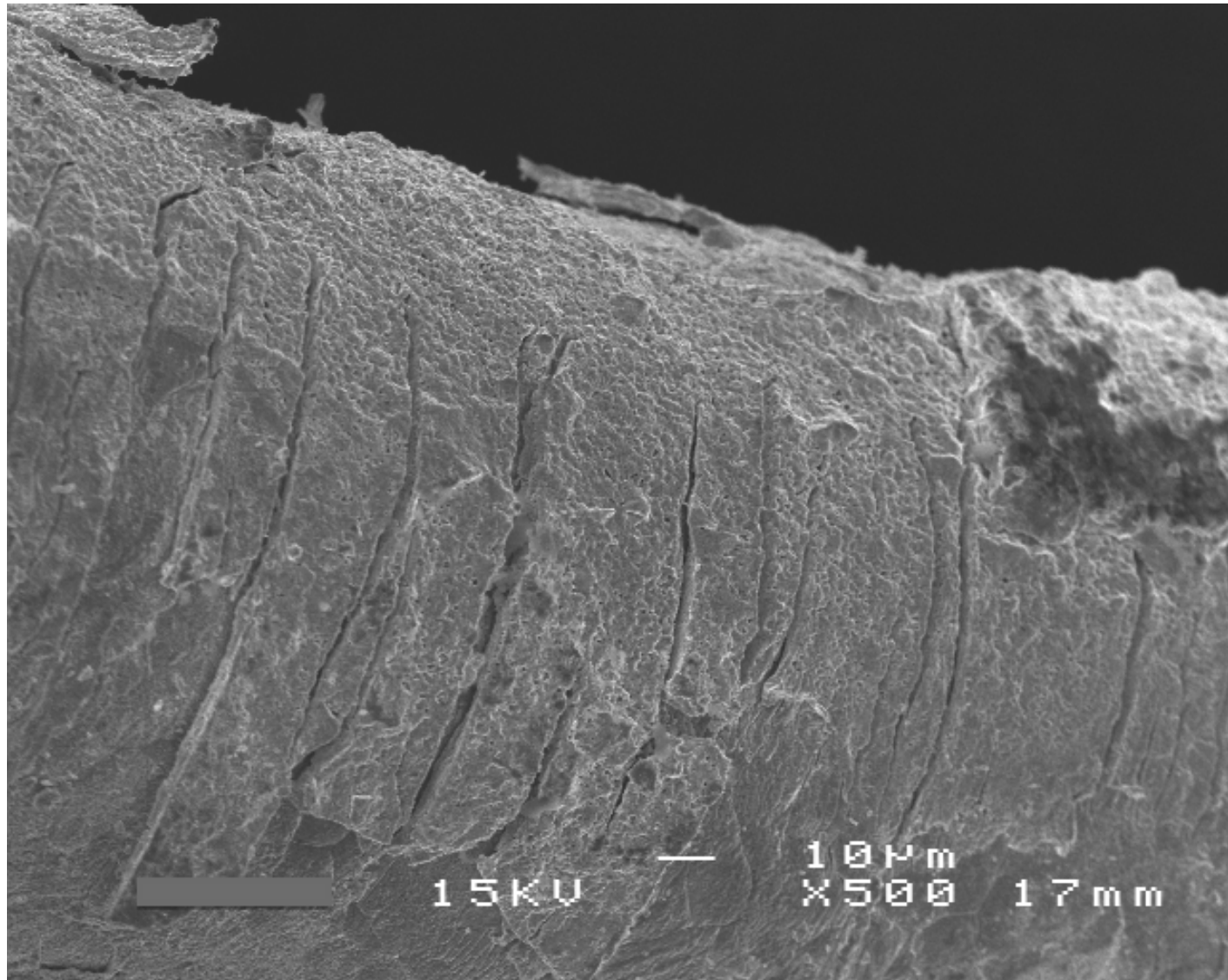
Typical resistance variations:



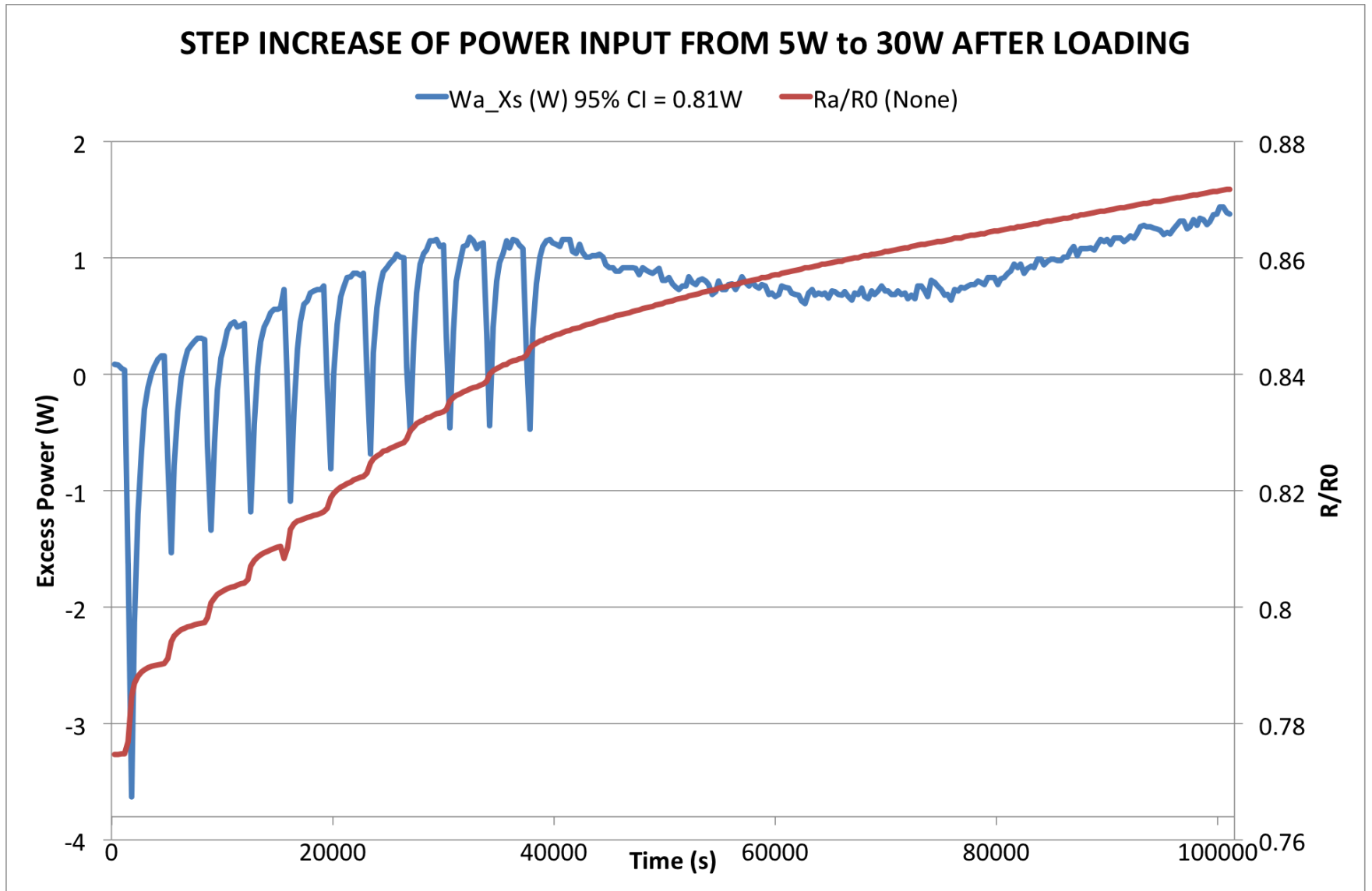
# Pre-Test SEM Characterisation



# Post-Test SEM Characterisation



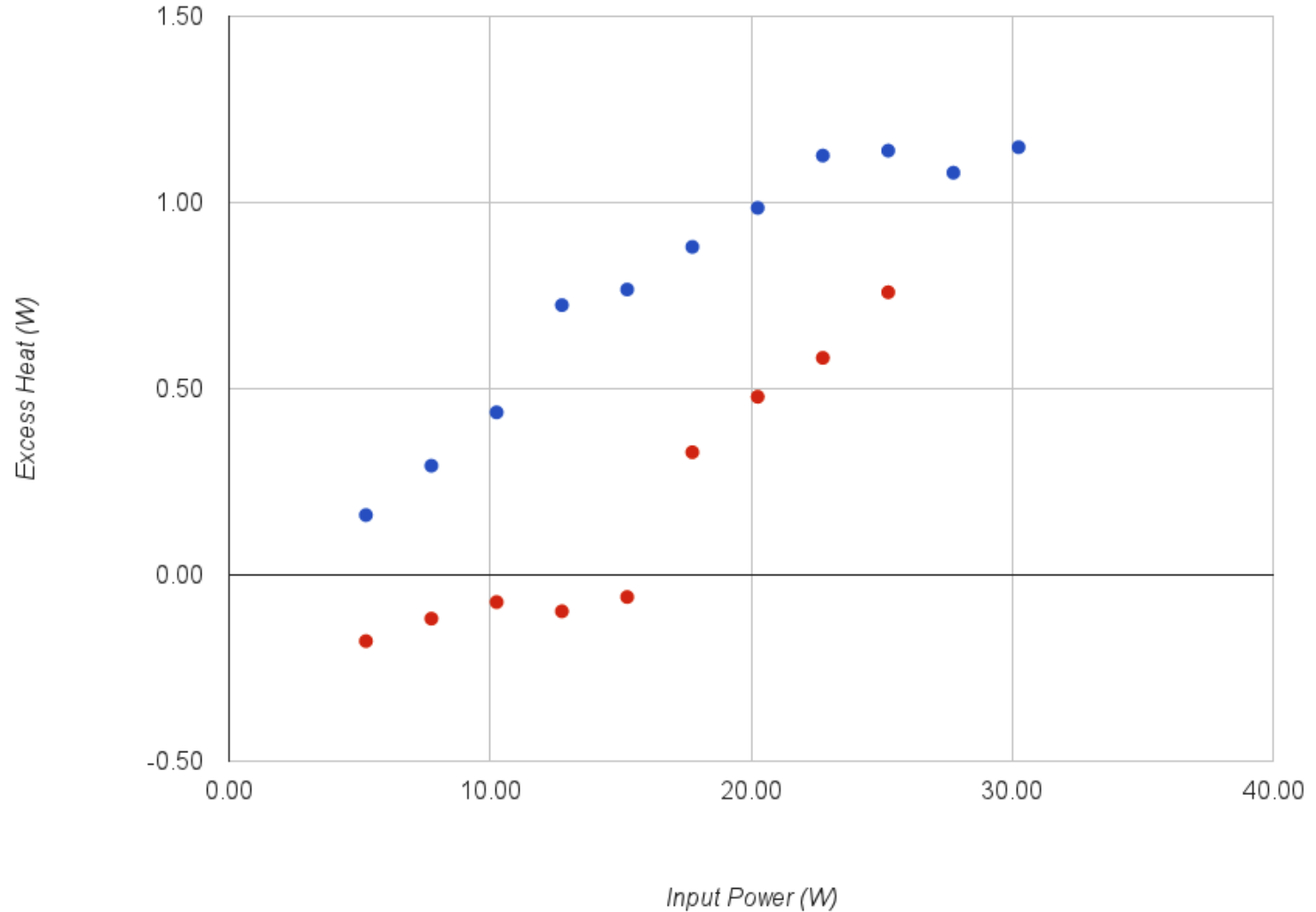
# Excess Heat



# Excess Heat

Excess Heat =  $f(\text{Power Input})$

■ P\_xs (Indirect Heating) ■ P\_xs (Direct Heating)



# Excess Heat

- Replications showed higher temperatures,
- First run tapering off 1.4 & 2.5 W @30 W input,
- Better yield of excess for 15W,
- Lower values after the first cycle,
- Triggering temperature is seen,
- Very close to what Francesco Celani claims.

# Open Questions

- Vacuum level is still critical?
- How is resistance drop due to hydride formation?
- Is part of it chemical in nature?
- Are we making the same systematic error?
- Where are the 30% of ICCF17?

# Conclusions

- Successfully replicated vacuum protocol in the US whereas EU didn't,
- => some wire work better than some others!
- Superficial absorption in cracks,
  - Vacuum protocol is not good for strong claim,
  - Appears that flux of hydrogen in the metal lattice creates heat!

**Still a lot of work remains**

# Future Developments

- New design of apparatus,
  - "Concentric Tube Calorimeter" is pulling data,
  - "Steel and glass cells" back up very soon,
  - Direct comparative experiment on replicas,
  - Some new design are in the HUG showroom,
  - High temp mass flow calorimetry under design,
  - Powder experiments,
- Larger research group, new contributors,
- New platform for live and open research!

**COME JOIN US!**  
QuantumHeat.org

Thank you!

**This work is dedicated in memoriam to  
Martin Fleischmann**