Update on Cu Motherboard cleaning protoc

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Outline

I. R&D of Copper cleaning Protocol for Darkside Motherboards

II. Copper Components transport and manipulation

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R&D of Copper Cleaning Protocol for Darksid Mother boards

4 Squared samples from the same batch of copper motherboards

1. Reference sample: Standard CUORE Protocol (TECM) (E=100 µm)
2. Test Sample 1: TEC (E=100 µm)
3. Test Sample 2: C1EC (E=100 µm)
4. Test Sample 3: C1EC (E=50 µm)

- T=Tumbling
- E=ElectroPolishing
- C=Chemistry
- M=Plasma Cleaning
- C1=Chemical Pre-Cleaning

Legnaro Cleaning Plants:

Physical-Chemical Treatments:

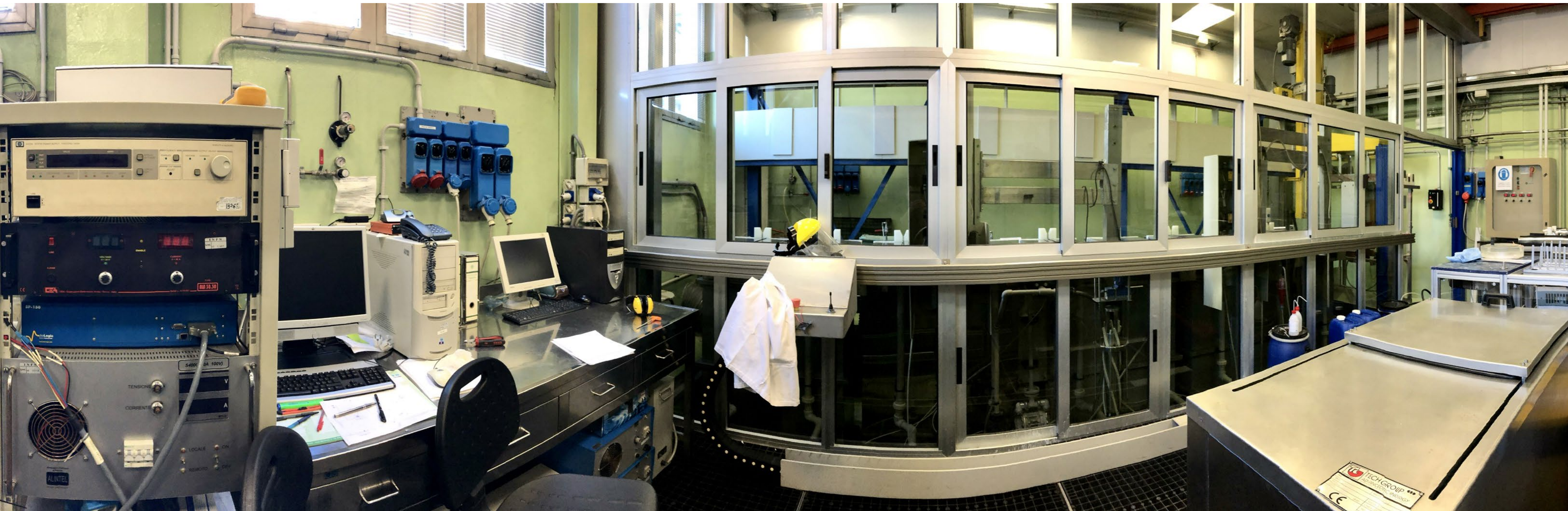
- Barrel Polishing (Tumbling)
- Chemical and Electrochemical Treatments

Chemical Plant

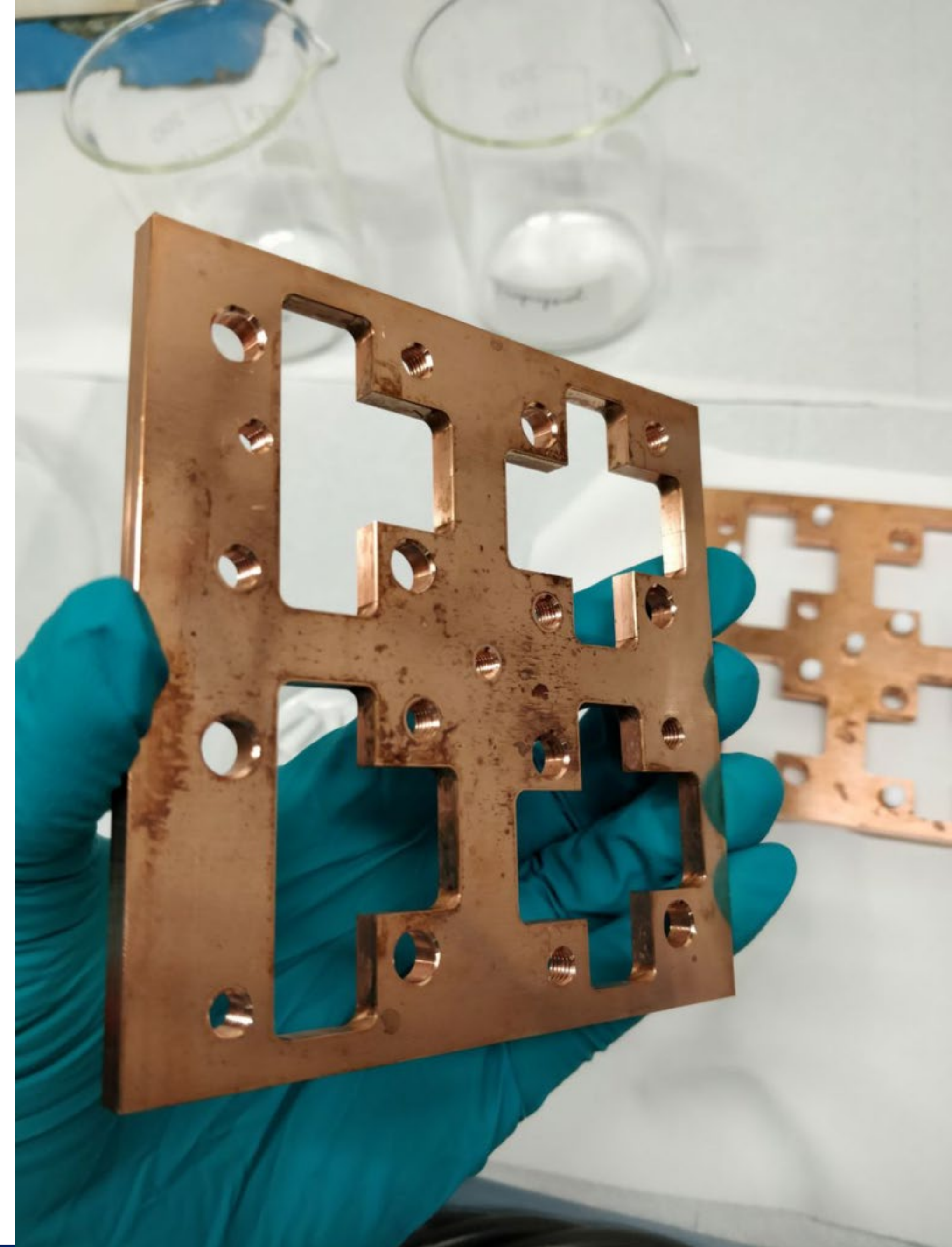
- Physical Vapour Deposition (Sputtering and Plasma Cleaning)

Coating and Plasma Cleaning Plant

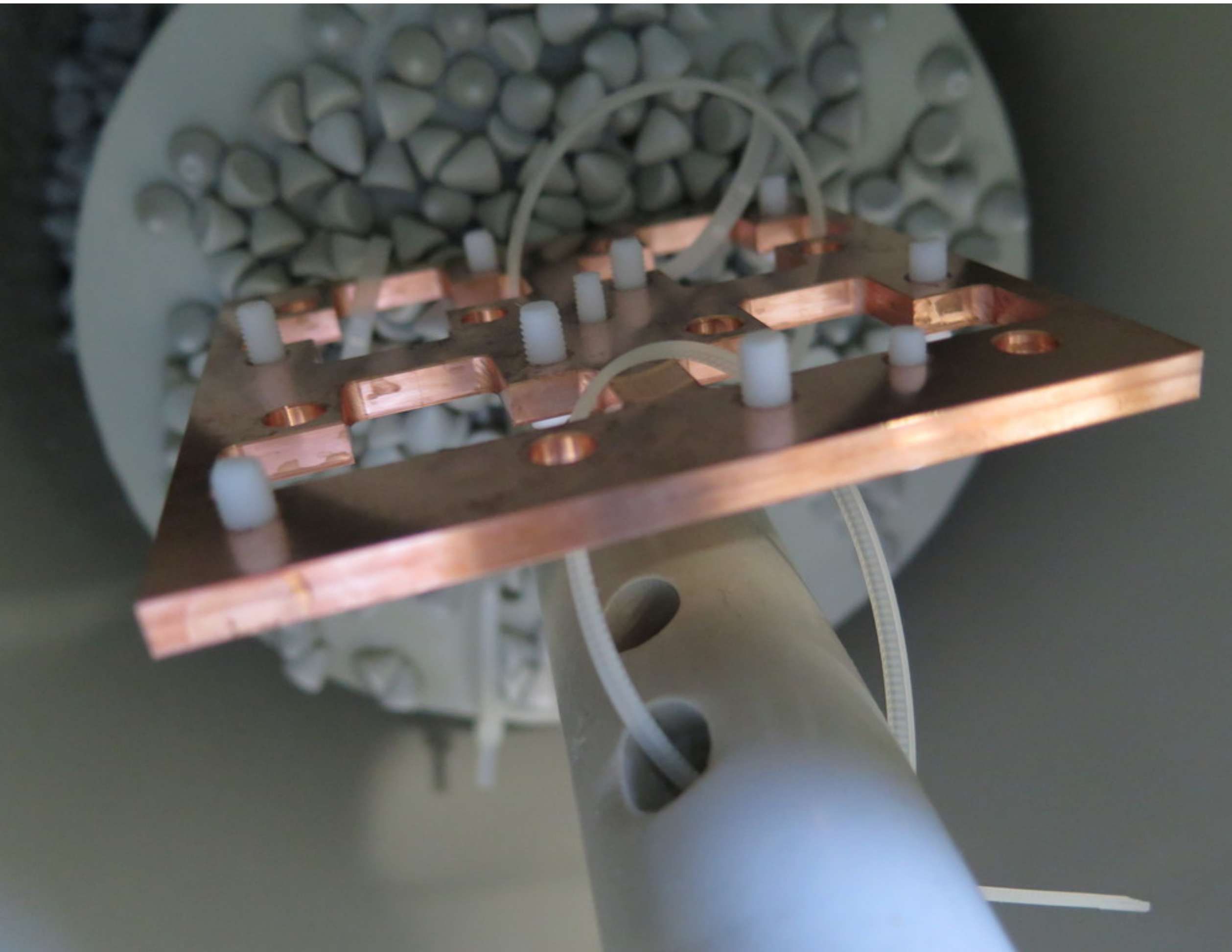
ChemicaPlant



Sample from Motherboard



Tumbling (Mechanical polishing)



Alumina powder in epoxidic matrix cones

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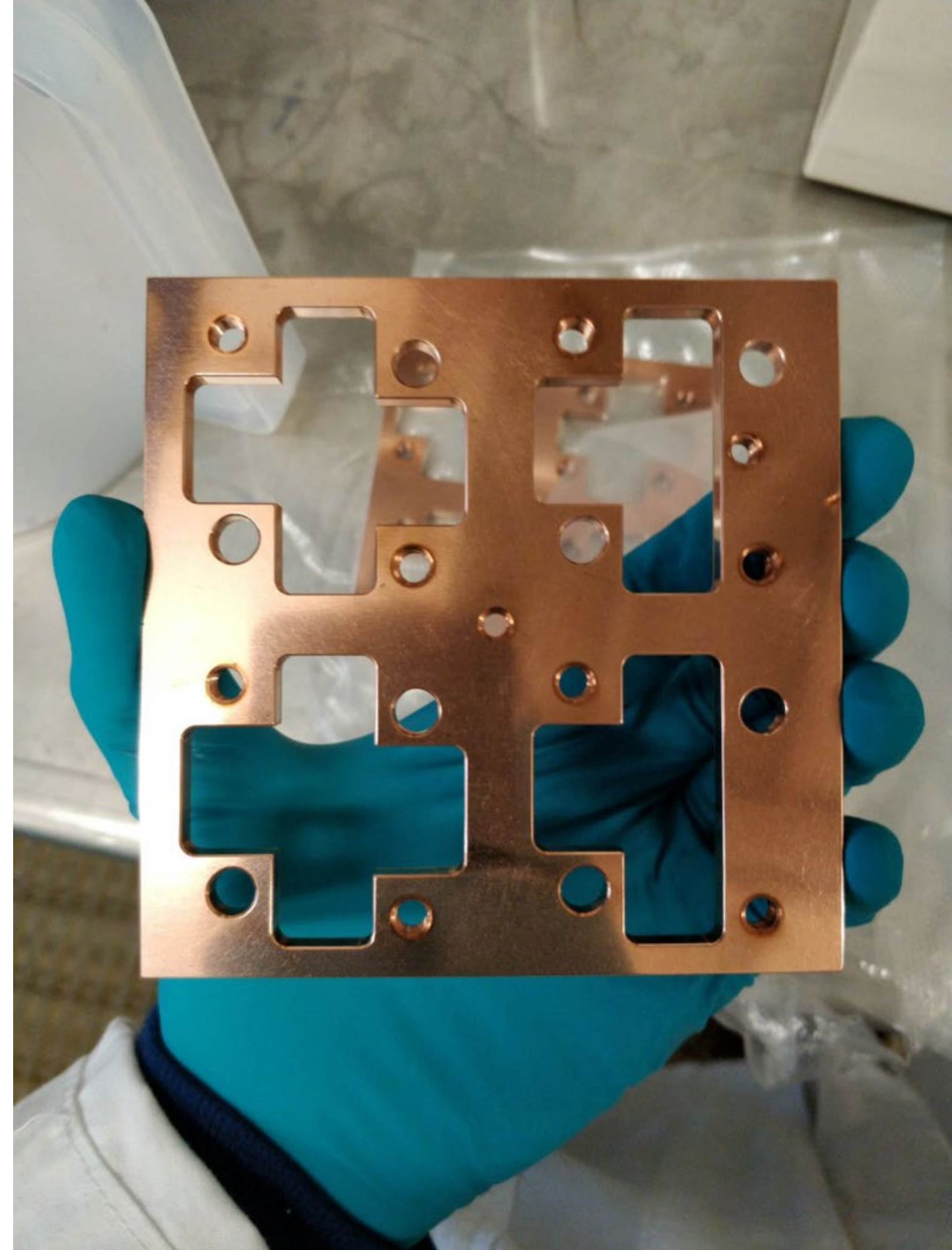
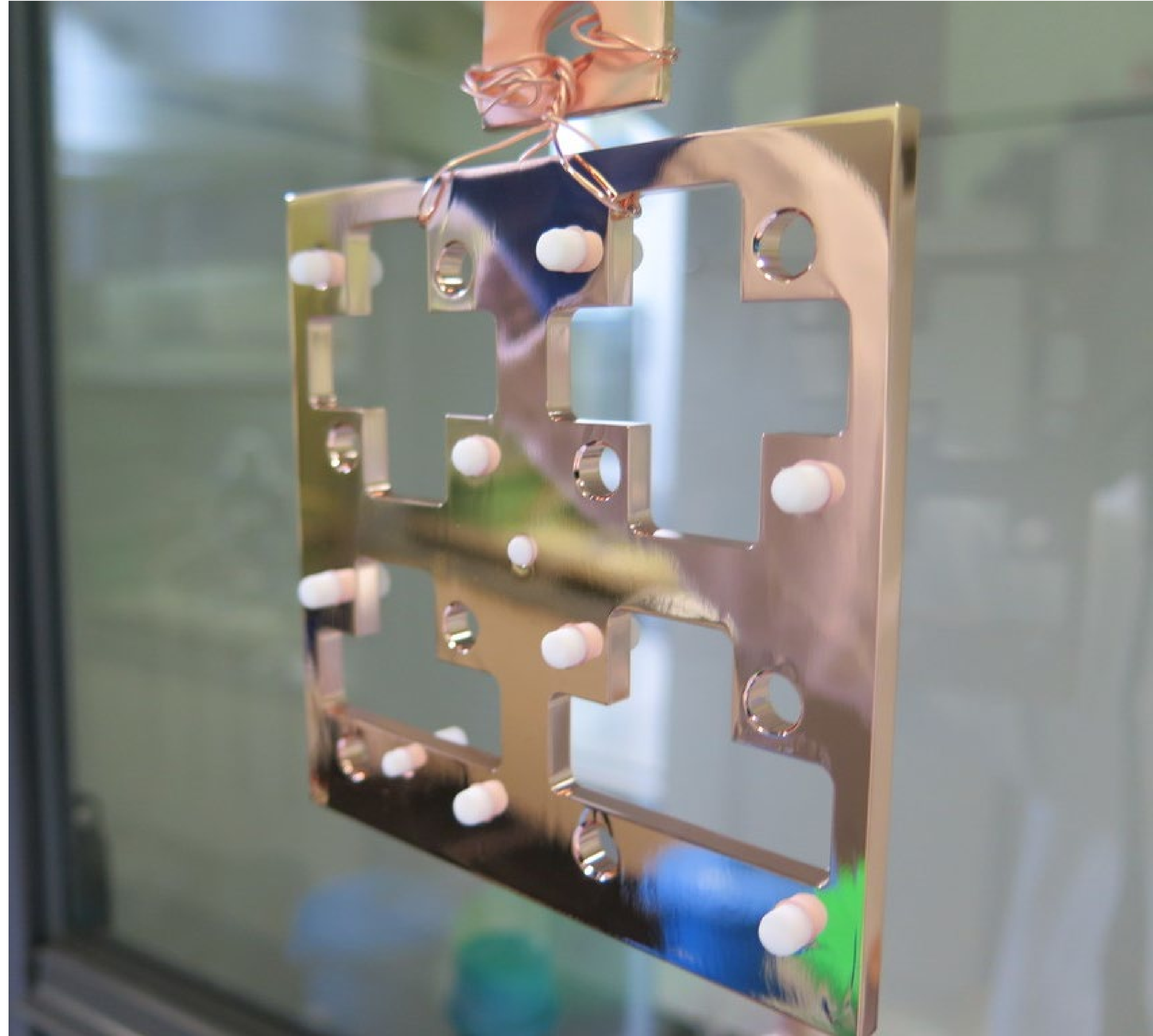
Sample After Tumbling



Electrochemical Polishing

Sample After Electropolishing

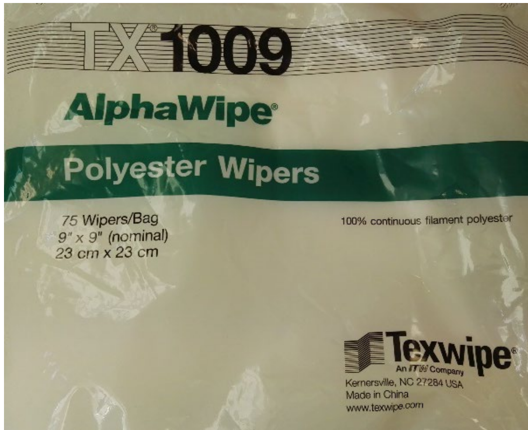


CoatingPlant

Plasma Polishing

Work in Progress

Copper Components Transport and Manipulation



Prevention of Recontamination during the cleaning process:

1. Manipulation with double gloves (Class 100 clean room gloves + polyethyl gloves)

2. Manipulation with Alpha Wipe TX1009 tissue 100% continuous filament polyester

3. Storage in single polyethylene bag under vacuum (during the intermediate steps of cleaning)

4. Cosmogenic activation limited to 90 days

5. Final storage in N2 fluxed cabinet

NB: The vacuum pump (Reber 9700N) for vacuum packaging is a commercial electrical appliance for food storage under vacuum but commissioned with option oil and grease free. These appliances are frequently replaced due to th absence of lubrication on mechanic parts.

Quality control

It is mandatory to insert after each step of the production cleaning protocol ***quality control*** *on:*

1. Raw Material analysis (physical properties).
2. Chemical solution analysis.
3. Deionised water analysis.
4. Analysis on copper test samples after each cleaning treatment (radiopurity).

Copper Components transport and manipulation

Transport between the cleaning plant and the storage plant:

1. Not air freight

2. Triple plastic bags under vacuum. The packaging is made in a clean room class 1000 and collected inside a plastic box under vacuum too.

3. Cu transport logistic was organized to minimize the cosmogenic activation

4. Database with bar codes for every component to collect all the cleaning passages before the installation.

Historical Database of transport and process o each component

It is mandatory the database creation to classify the production steps of each component:

1. Material Supplying.
2. Mechanical Machining.
3. Surface cleaning protocol.
4. Transport.
5. Storage.

Abatement Function Rn222 related with time exposure and number of bags

$$F_a = \frac{\text{Po210 activity (in plastic bags PET)}}{\text{Po210 activity (Radon atmosphere)}}$$

Sample	Exposure [d]	F_{ab}
Copper 1 bag	67	>0.970
Copper 2 bags	63	>0.973
Copper 3 bags	56	>0.973
Copper 1 bag	1080	0.994 ± 0.015
Copper bare	1080	0

Data from Luca Pattavina luca.pattavina@lngs.infn.it from CUORE collaboration