



*Hydrotech S.r.l.*

*Environmental Research*

*Company's presentation*

*Flash Forward Project*

*Trieste, Italy*

*23 February 2013*

# ... PROFILE ...

*Hydrotech is headquartered at the AREA Science Park, close to the city of Trieste.*



*The AREA is one of Europe's leading science parks and is home to over 60 R&D centres*



## ... *PROFILE* ...

**HYDROTECH** has been set up in 1996 by a group of professionals drawn from the worlds of industry and research



The founders brought know-how and experience both in chemistry and in environmental technologies



## ... *PROFILE* ...

Headquartered at the AREA Science Park of Trieste - Italy since its establishment in 1996, HYDROTECH carries out research & development activities in the environmental sector both on its own account and on behalf of industries and public bodies.

HYDROTECH boasts a wide experience in environmental chemistry, industrial chemistry, geology, hydrogeology and environmental engineering, with applications ranging from the characterization of contaminated site to soil and water remediation, from emission treatment to industrial residues recovery and valorization.

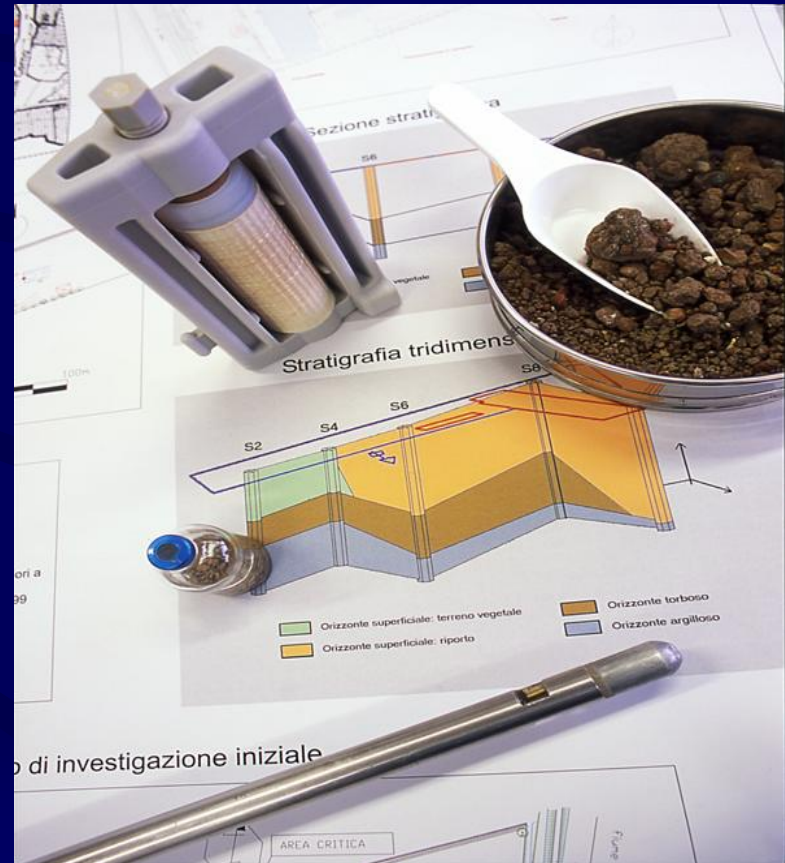
# ... PROFILE ...



*Hydrotech is an R&D centre offering technology transfer services in the environmental sector.*

*Hydrotech focuses on*

- ✓ *contaminated site investigations,*
- ✓ *environmental pollution assessment,*
- ✓ *environmental modeling & simulation,*
- ✓ *risk analysis,*
- ✓ *soil and water treatment technologies,*
- ✓ *environmental reclamation design,*
- ✓ *pollution monitoring*



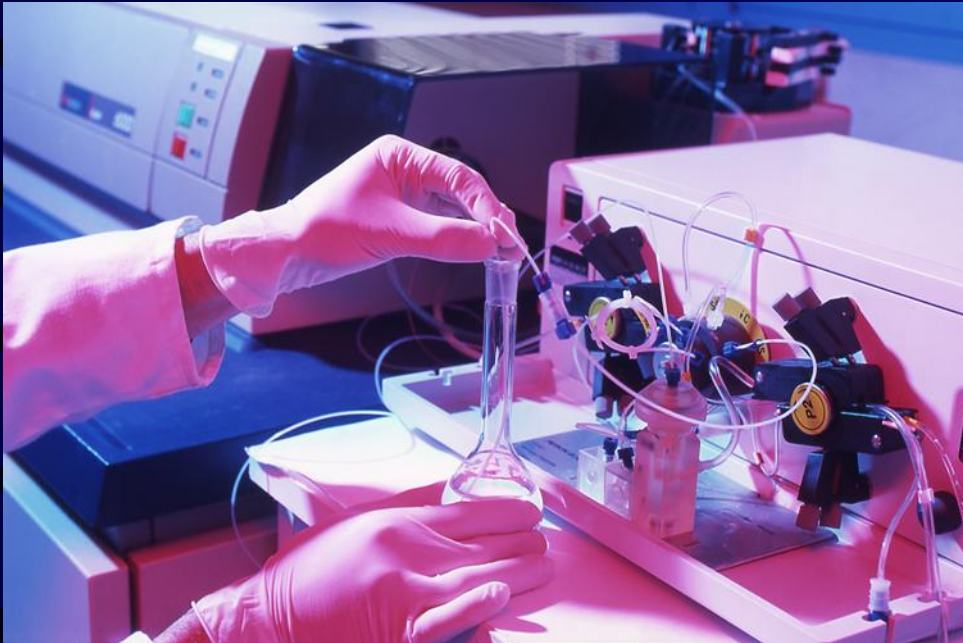
*HydroTech*



The services offered by **HYDROTECH** focus on:

- ✓ *Environmental surveys, feasibility studies and intervention planning for environmental protection and recovery;*
- ✓ *Investigations of contaminated sites by means of in-situ and laboratory techniques (site assessment);*
- ✓ *Computer aided environmental modeling & simulation in 2D/3D;*
- ✓ *Risk Analysis in contaminated sites;*
- ✓ *Design, development and co-ordination of plans for reclamation of contaminated sites; planning of water and land-asset management;*
- ✓ *Planning and design of treatment platforms for waste water and solid waste: domestic and industrial installations, including both new solutions and revamping of existing structures; development of technologies for waste recovery and exploitation;*

# ... PRODUCTS, SERVICES AND APPLICATIONS ...



The services offered by **HYDROTECH** focus on:

- ✓ *Process simulation on lab-scale and on pilot plants, design and execution of test runs on industrial plants: applied research and experimentation for the reduction of pollutants and optimisation of abatement processes;*
- ✓ *Characterisation of the environmental matrices and of waste;*
- ✓ *Monitoring of emissions: detection and measurement of pollutants in both liquid and air-borne matrix, with continuous data acquisition on both stationary systems and mobile systems; monitoring of work sites.*
- ✓ *Training. Specialised courses, seminars and workshops. Under-graduate and post-graduate training courses. Training sessions for technical staff also delivered at the Client's site.*
- ✓ *Regulatory assistance. Updated information on the sector's regulations, consultancies and assistance in applying for permits.*

# ... THE STRUCTURE ...

## *the Lab unit*



- ✓ 1 Lab unit Manager (Ind. Chemist)
- ✓ 1 Lab Head (Chemist)
- ✓ 1 Lab Techn. (Chemist)

characterizations, tests, analyses, ...  
to be performed

- ✓ 1 R&D/Techn. unit Manager (Ind. Chemist)
- ✓ 1 R&D Head (Geologist)
- ✓ 3 R&D/Techn. (2 Geologists, 1 Env. Engineer)



## *the R&D/Techn. unit*

data & results of characterizations,  
tests, analyses, ...



# ... THE STRUCTURE ...

## *Role of the lab*

- ✓ Gather and provide data (i.e. concentration, speciation, etc.) about analytes within the investigated materials
- ✓ Provide tools and instructions for appropriate sampling
- ✓ Critically interpret analytical data





## ... CERTIFICATIONS AND ACCREDITATIONS ...

- ✓ Hydrotech's chemico-analytical lab is accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) within the norm UNI EN ISO IEC 17025
- ✓ Hydrotech is certified by SGS Italia for "*R&D, studies and design in the environmental sector; chemico-analytical investigations*" within the norm UNI EN ISO 9001
- ✓ Hydrotech is recognized by Regione F.V.G. as highly qualified structure in the field of "*remediation technologies, environmental investigations, analytical & environmental chemistry*"



## ... *RESEARCH SECTORS* ...

- **Analytical chemistry**

*e.g.: Design and development of an analytical method for the quantitative determination of phenols and chloro-phenols in liquid phase by means of pre-acetylation process*

- **Environmental chemistry and geo-chemistry**

*e.g.: Behavior of arsenic and its compounds in pyrite ashes: implications for contaminated sites remediation*

- **Remediation and environmental recovery technologies**

*e.g.: Permeable Reactive Barriers: study on materials for the purification of water contaminated by chlorinated solvents*

- **Industrial waste/by-products treatment and valorization**

*e.g.: Study and development of innovative treatment processes for slag inertization in steel industry*

*Behavior of arsenic and its compounds in pyrite  
ashes: implications for contaminated sites  
remediation*



*Behavior of arsenic and its compounds in pyrite  
ashes: implications for contaminated sites  
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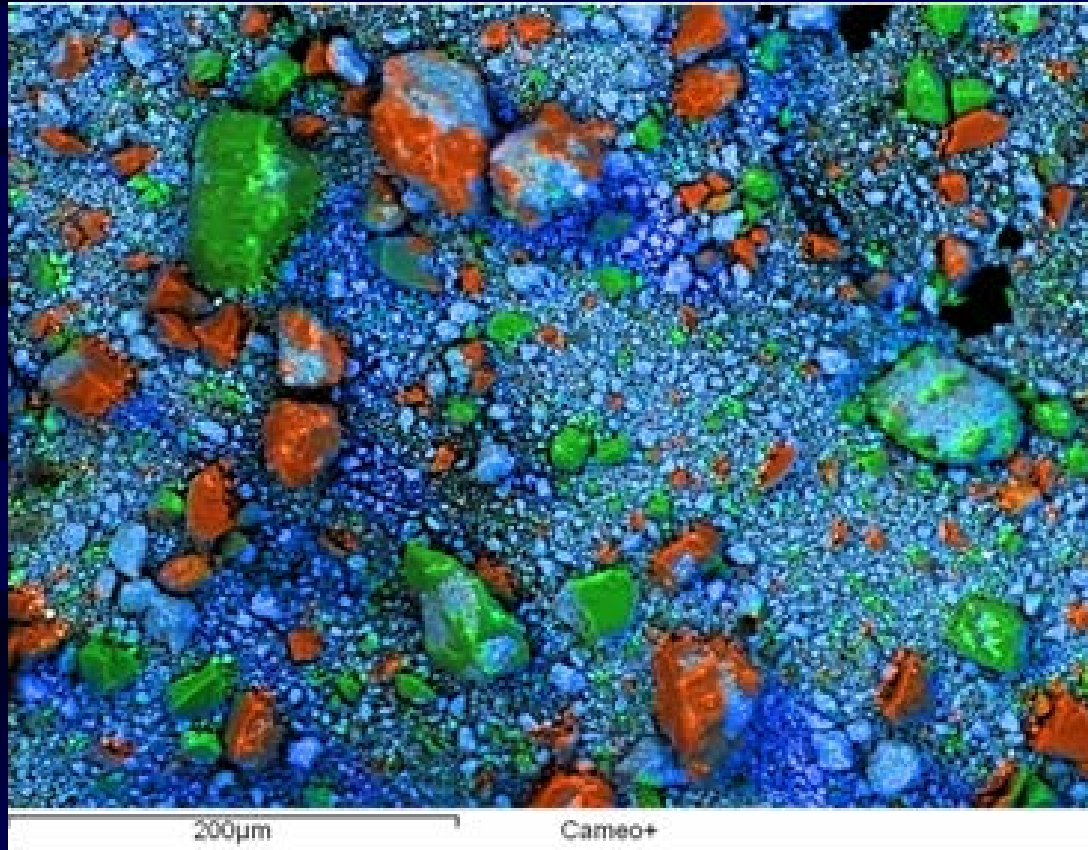


# *Behavior of arsenic and its compounds in pyrite ashes: implications for contaminated sites remediation*

*Elemental composition of pyrite ashes samples as obtained by ICP-MS analyses*

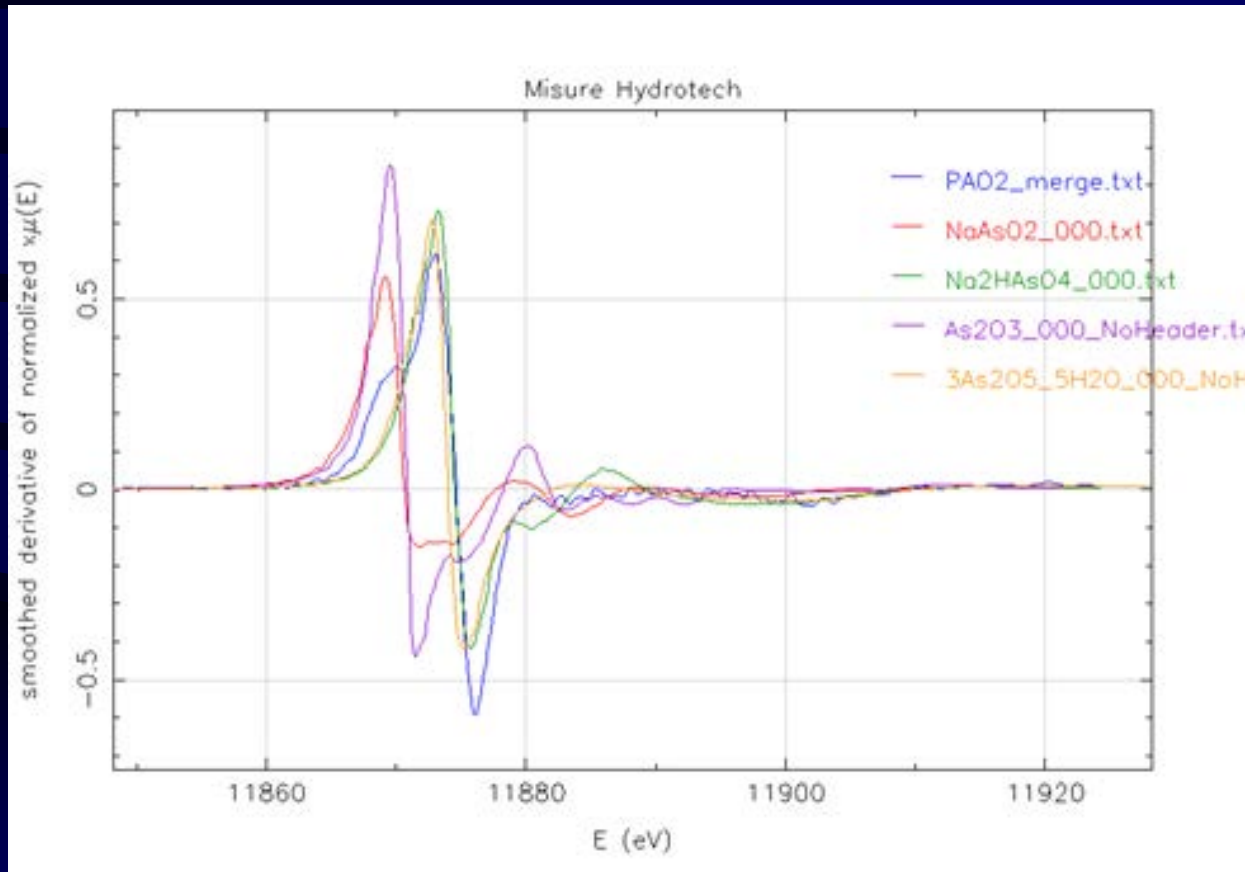
Element	unit	Sample A	Sample B	Sample C	Mean ABC	PA02
As	mg/kg (d.m.)	298	269	262	266	272
Cd	mg/kg (d.m.)	5.1	14.0	3.9	7.7	7.5
Cr tot	mg/kg (d.m.)	13.2	8.6	11.7	11.2	11.4
Cu	mg/kg (d.m.)	1909	3047	3693	2883	2798
Fe	mg/kg (d.m.)	164486	448055	632446	414996	401242
Ni	mg/kg (d.m.)	210	291	223	241	192
Pb	mg/kg (d.m.)	2709	3154	4160	3341	3282
Sb	mg/kg (d.m.)	21.7	90.7	24.5	45.6	44.8
Zn	mg/kg (d.m.)	1743	3793	6942	4159	3992
d.m.	%	84.3	79.9	82.4	82.2	98.3

*Behavior of arsenic and its compounds in pyrite ashes: implications for contaminated sites remediation*



*Image of high resolution EDS mapping for major elements in the sample. Blue region: Fe; green region: Si; red region: Ca*

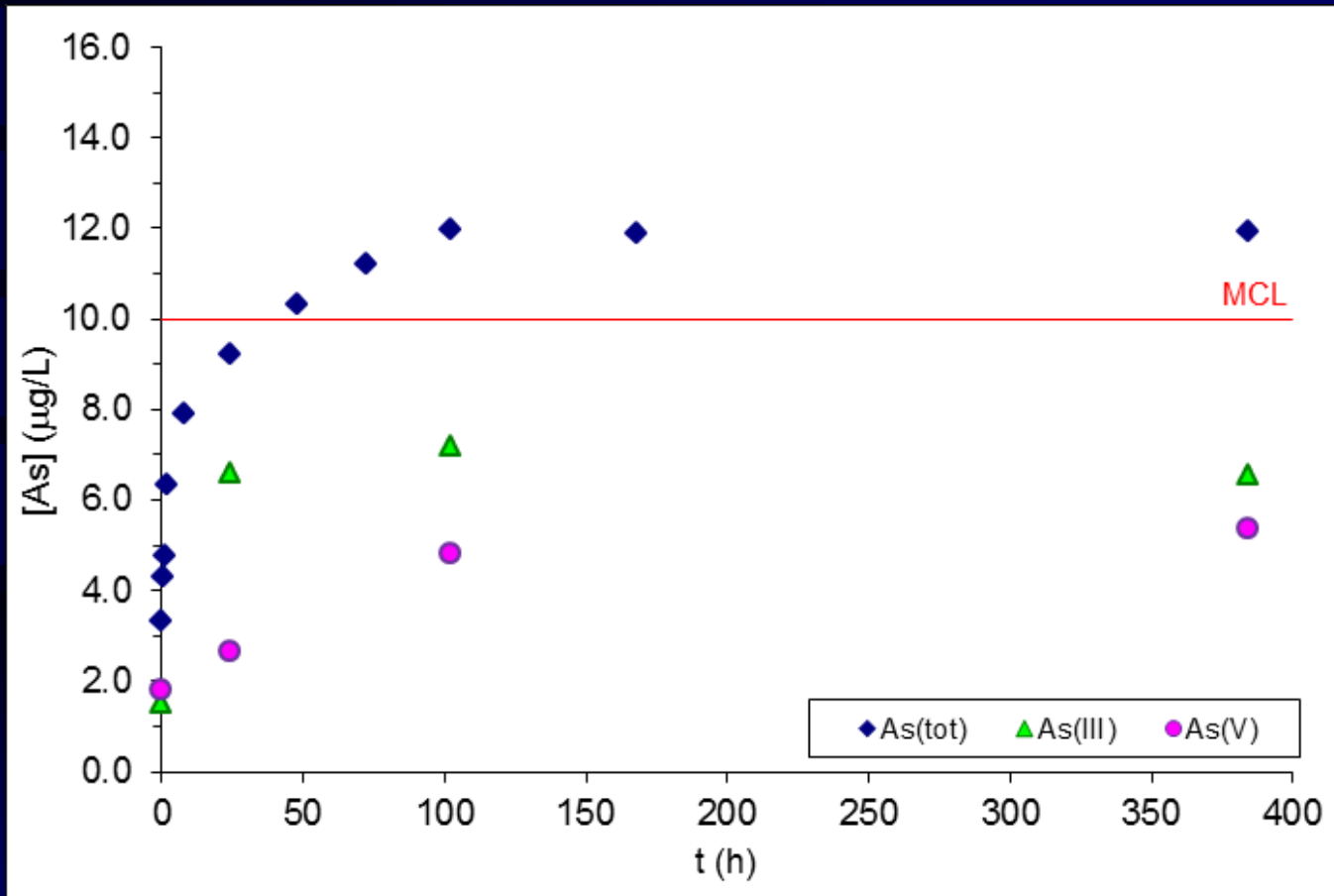
# *Behavior of arsenic and its compounds in pyrite ashes: implications for contaminated sites remediation*



*First derivatives of the As K-edge XANES spectra of the sample and of the  $\text{NaAsO}_2$ ,  $\text{Na}_2\text{HAsO}_4$ ,  $\text{As}_2\text{O}_3$ ,  $\text{As}_2\text{O}_5$  standards*

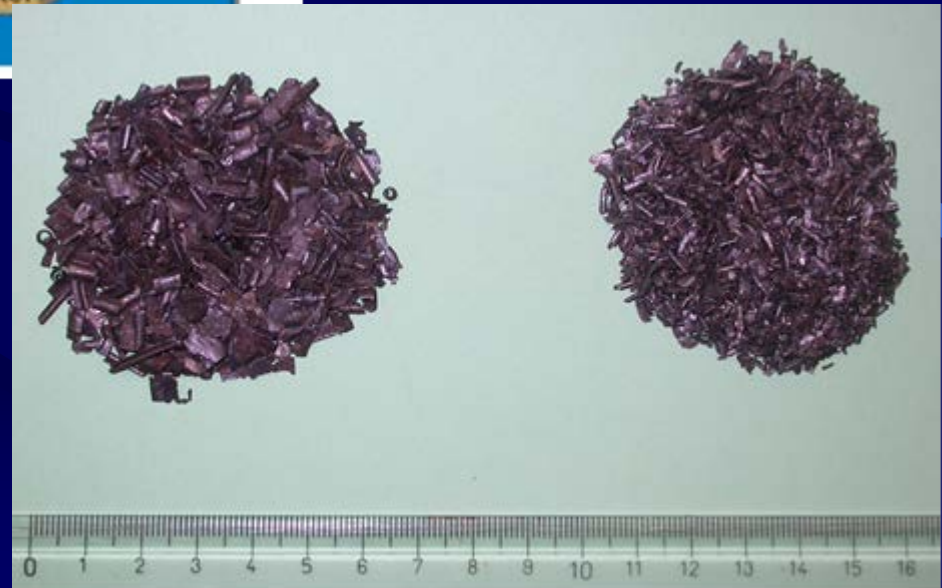
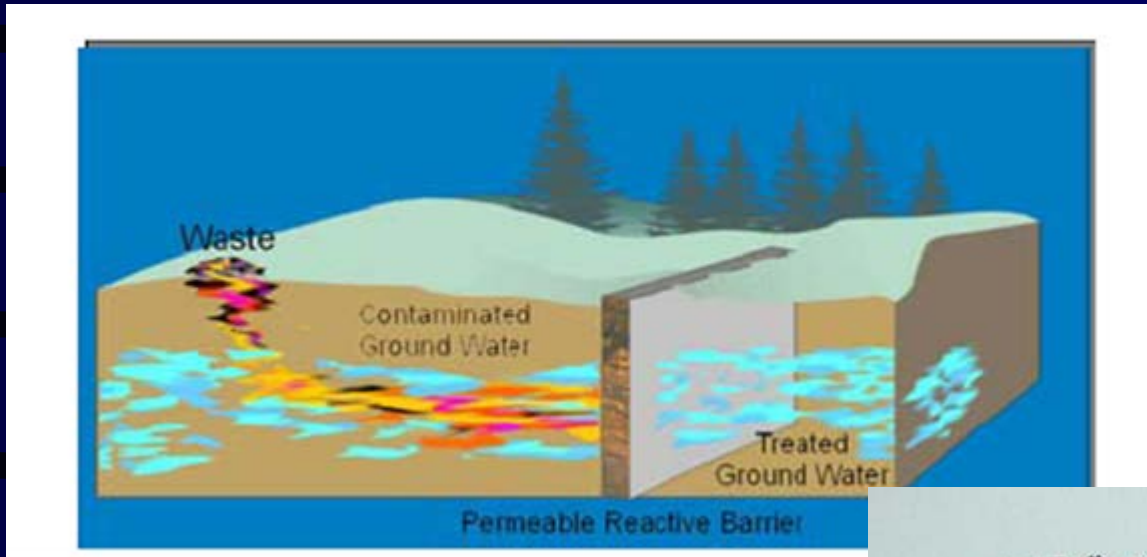


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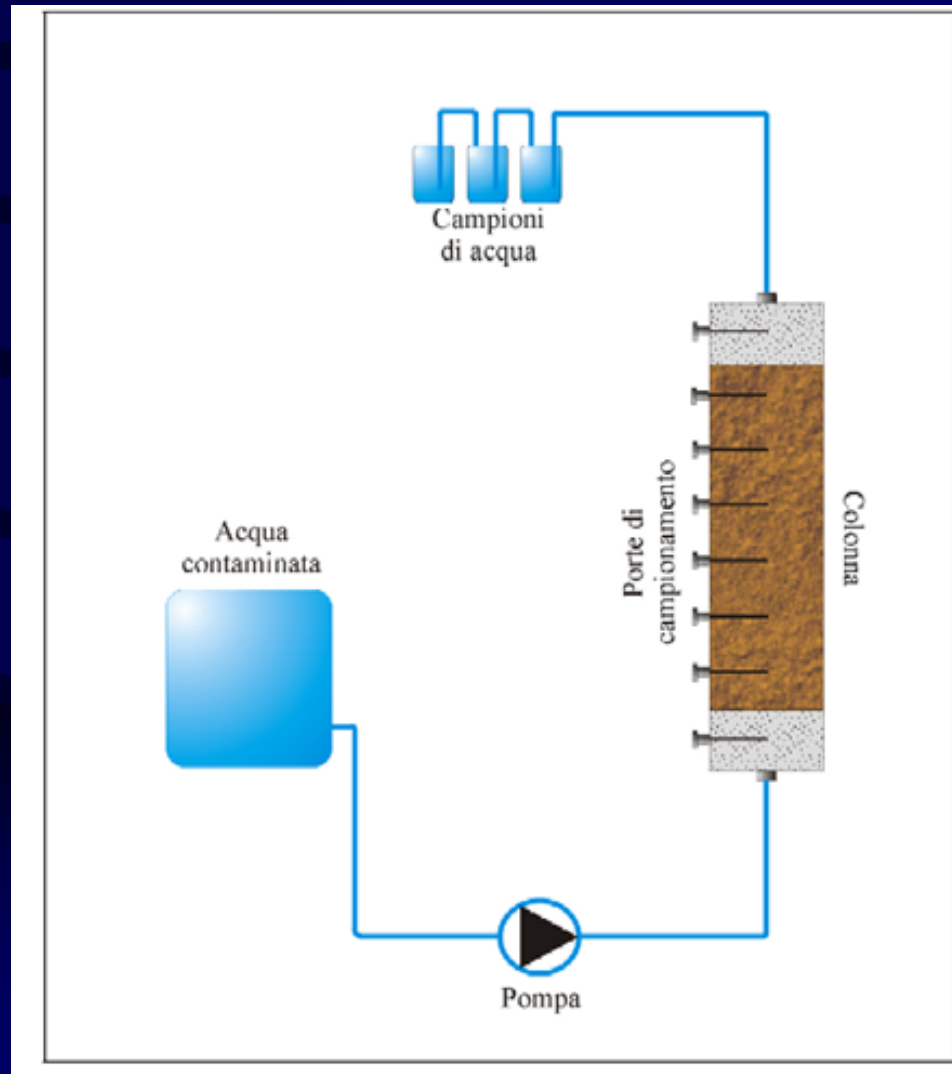


*As, As(III) and As(V) release kinetics: concentration vs. reaction time*

*Permeable Reactive Barriers: study on materials for the purification of water contaminated by chlorinated solvents*



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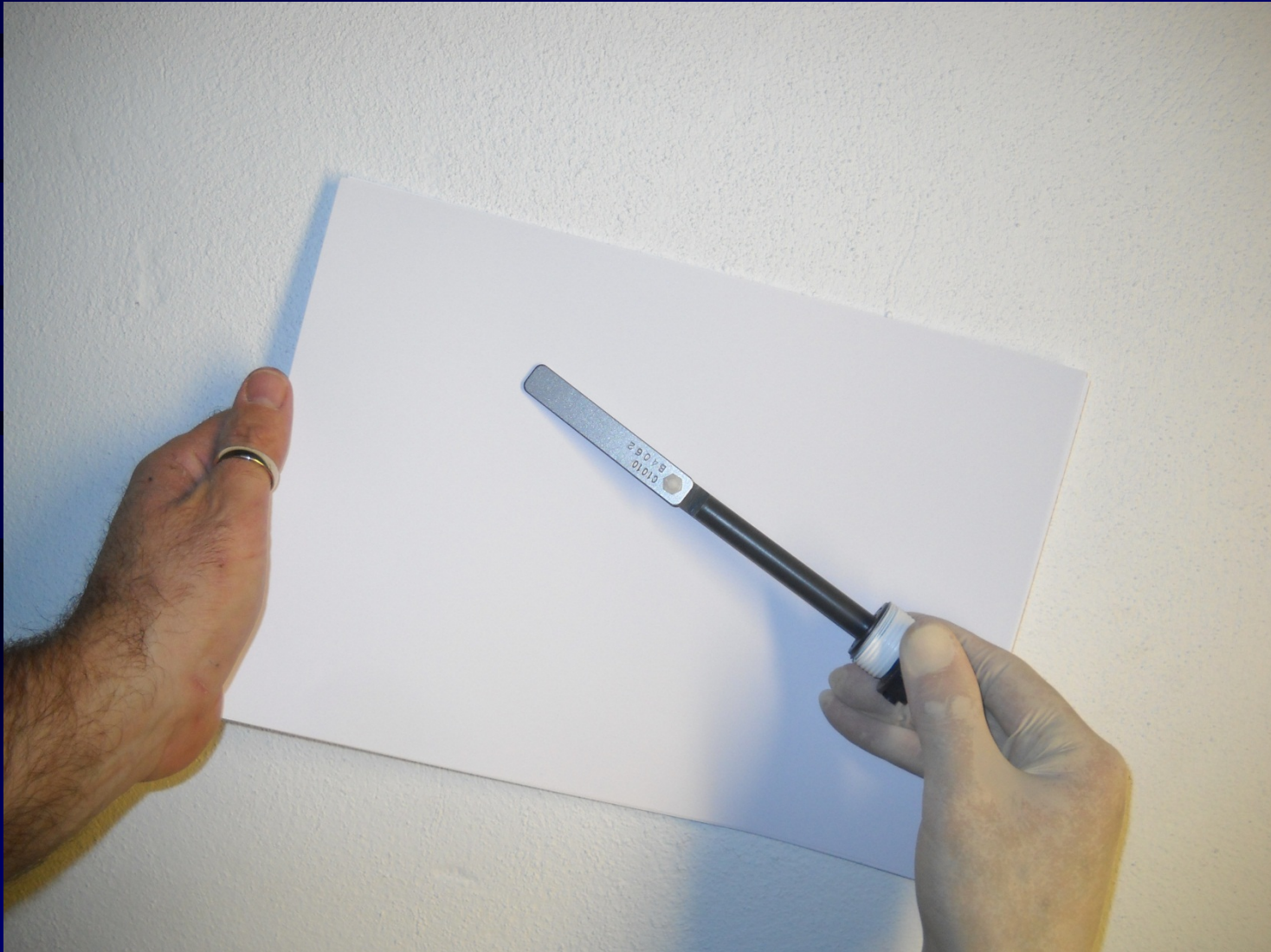
## ... ONGOING RESEARCH WORK ...

- *Development of analyte specific sensor-based devices for real-time measurement of hydrogen peroxide in aqueous media*
- *Study of corrosion processes of metal surfaces in water solutions of organic and inorganic peroxides at very low concentration*
- *Development of analytical methods for quantitative determination of Fe nanoparticles in brain tissues via ICP-MS and LA-ICP-MS*

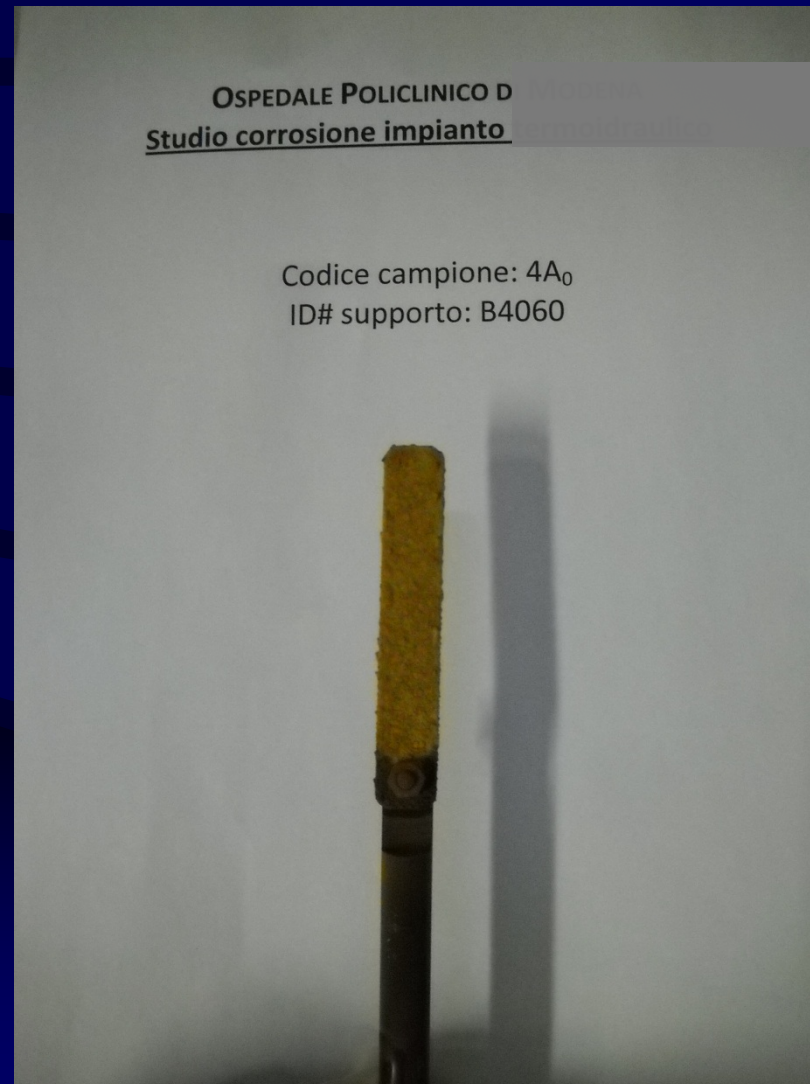
*Study of corrosion processes of metal surfaces in water solutions of organic and inorganic peroxides*



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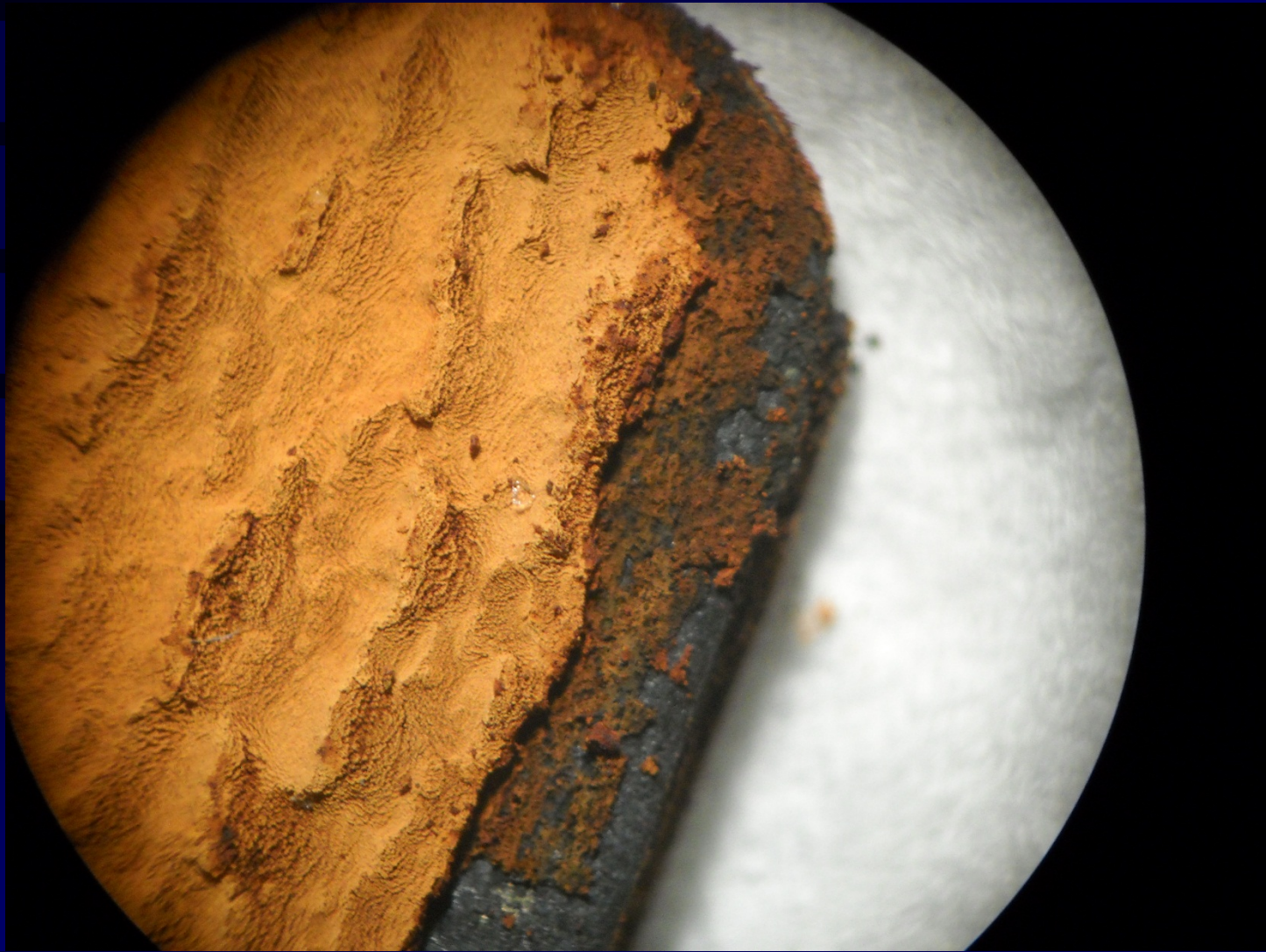


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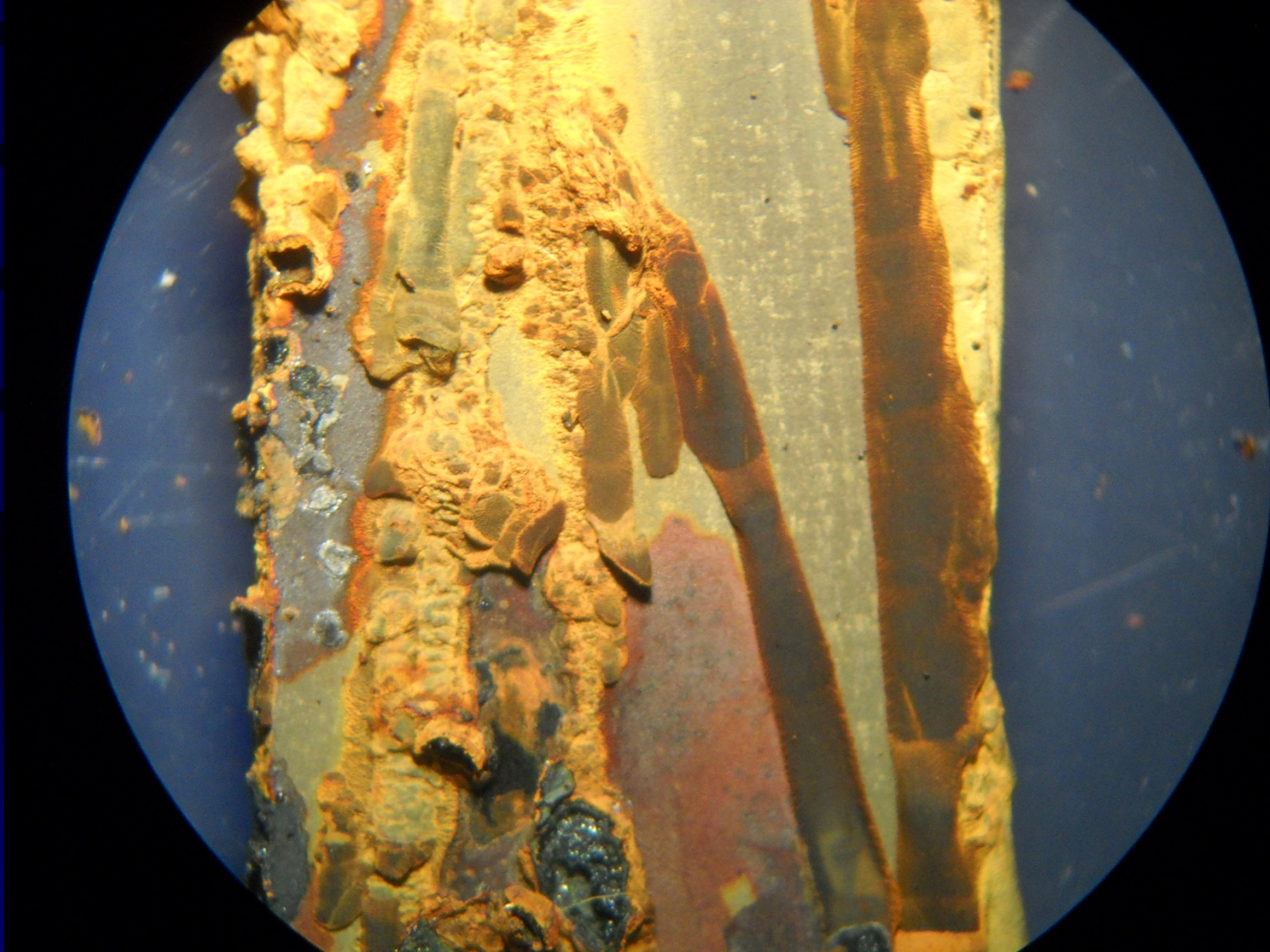




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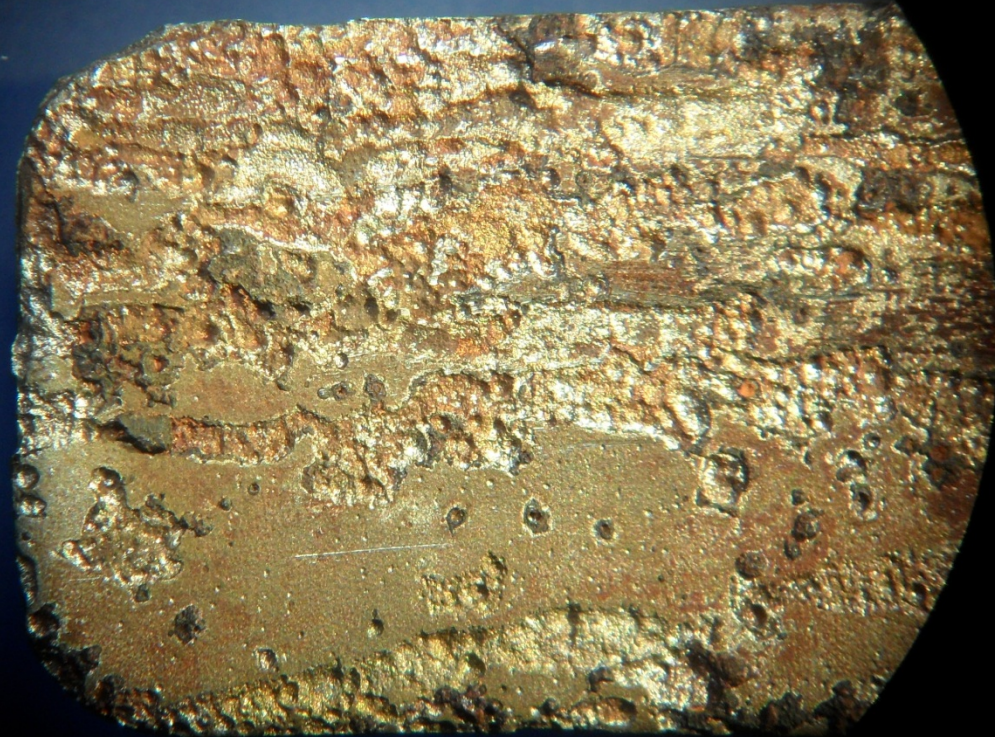
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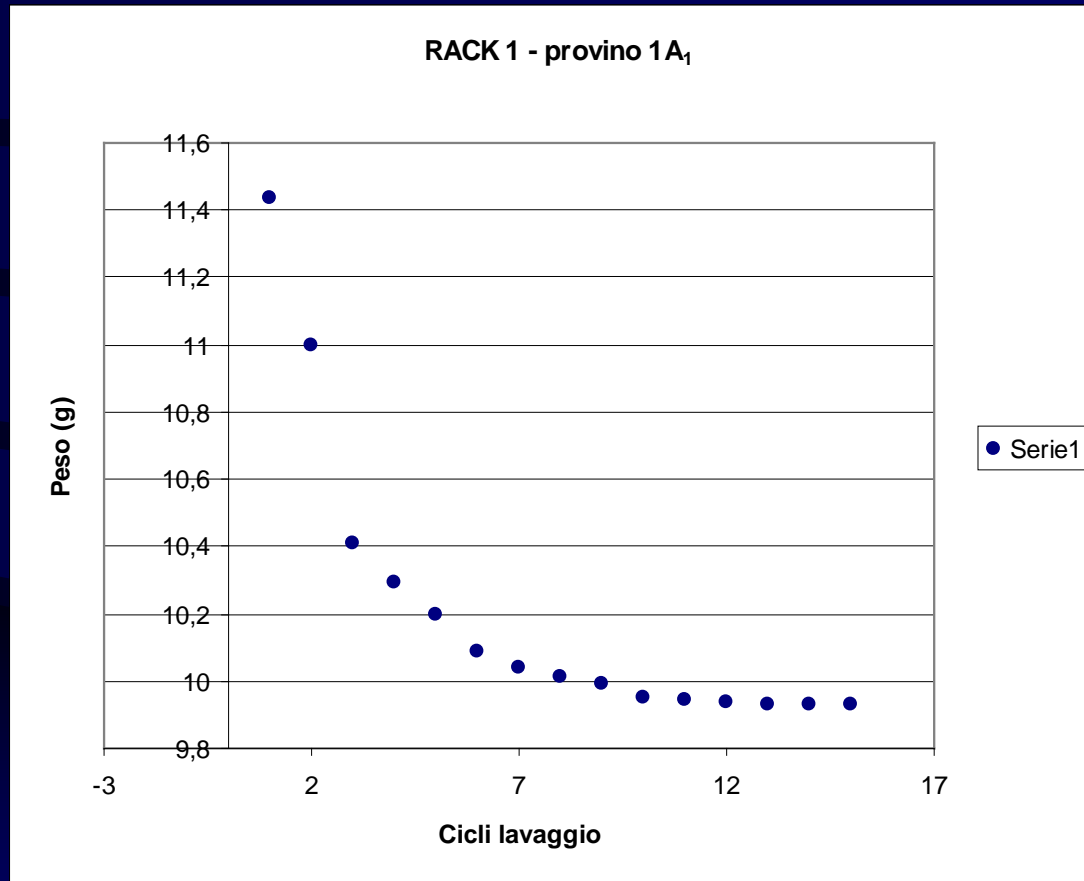
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# *Study of corrosion processes of metal surfaces in water solutions of organic and inorganic peroxides*



**WEIGHT LOSS**



## *... SOME COLLABORATIONS ...*

- AREA Science Park, Trieste, IT;
- National Institute of Oceanography and Experimental Geophysics, OGS, Trieste, IT
- Experiment Institute for Plant Nutrition – Agricultural Research and Experimentation Council, ISNP-CRSA, Gorizia, IT;
- University of Padova, IT;
- University of Trieste, IT;
- University of Udine, IT;
- Centre for Technology Transfer, Ljubljana, SI;
- Institute of Ecologic Studies and Research, BIOECEN, Piran, SI;
- Jožef Stefan Institute, Ljubljana, SI;
- University of Ljubljana, SI;
- Federal Environment Agency, Berlin, DE;
- Fraunhofer Institute, Schmallenberg, DE;



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