Espace de l'Europe 11 - CH–2000 Neuchâtel
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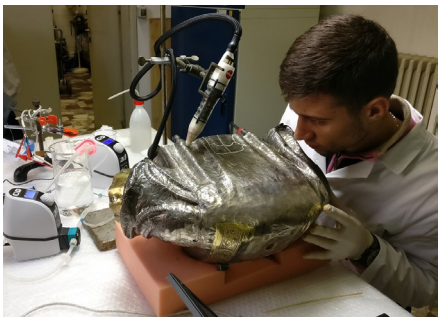
# ASTEC

## **A**pproaching the initial **S**urface appearance of **T**arnished silver heritage objects by **E**lectrolytic **C**leaning : Definition of optimal treatment conditions



### OBJECTIVES

This project focuses on developing controlled, safe and effective electrolytic treatments on heterogeneously tarnished historic silver objects, based on a precise knowledge of the variability of the original appearance of their surface, of the various forms of tarnishing, and of the precise impact of the reactions caused by electrolytic cleaning on tarnished surfaces.

It will allow to set the appropriate parameters during electrolytic cleaning in order to best approach the original surface appearance of tarnished silver objects. It requires the collection of information on the surface appearance of the objects during their manufacture, the evaluation of the conservation conditions of the residual metal under the tarnished layer, the study of the different forms of tarnishing and their evolution during the treatment, and the characterization of the metal surface obtained at the end of the treatment.

### PROGRAM

It comprises :

- To develop knowledge on the diversity of original surface appearances of European historical silver artefacts according to their chrono-cultural and functional contexts (use and social function);
- To study the fundamental principles of electrolytic cleaning of objects with different shapes and levels of tarnishing using appropriate electrochemical techniques (micro/local or macro/punctual with «Pleco») in order to best achieve the desired surface rendering;
- To characterise the surface obtained after cleaning, to assess its reactivity to the atmosphere and to limit or modify it in order to prevent any further re-tarnishing and ensure the durability of the objects;
- To use the knowledge acquired to treat a few pieces of museum collections using Pleco and to develop controlled cleaning protocols that best meet the specifications established by the collection managers.

### FUNDING

HES-SO, Réseau de Compétences Design et arts Visuels.

### PROJECT LEADER

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### PARTNERS

Empa, Laboratory for Joining Technologies and Corrosion, Advanced Materials and Surfaces, Dübendorf; University of Florence, Dipartimento di Storia, Archeologia, Geografia, Arte e Spettacolo – SAGAS, Florence, Italy; Opificio delle Pietre Dure, Florence, Italy; Musée historique de Lausanne, Switzerland; Tesoro dei Granduchi, Palazzo Pitti, Florence, Italy.

### DURATION

24 months
1.9.2021 - 31.8.2023

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### MAIN EXPECTED RESULTS

- To assess the surface of tarnished silver historic objects at each stage of their cleaning and to decide with the collection managers on the best intervention to carry out;
- To better understand the tarnish developed on historic objects according to their original surface finish through the in-depth characterization of artificial metal coupons simulating real objects;
- To understand the mechanisms developed during electrolytic cleaning of these artificial metal coupons in order to refine the current protocols;
- To validate our approach on real objects and establish the compromises to be made and the possible tolerances through a critical review.