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HELIX

Investigating metal bioremediation for the preservation of historical metal artworks

OBJECTIVES

The phenomena of surface alteration on metal artworks is a major concern in terms of visual aspect and can be related to corrosion processes occurring. Also, the presence of aged organic coatings (i.e wax, varnish) applied during past conservation interventions can fail achieving protection and need to be removed. Indeed, the exposure of these artefacts to caustic agents (i.e. from the environment or using inadequate cleaning agents) causes degradation and results for example in tarnishing and failures of protective coatings if present.
Current cleaning methods are mechanical or chemical methods, which are either too invasive, time-consuming and/or toxic. The HELIX project aims to exploit chemical uptake processes occurring in microorganisms to develop innovative green and non-invasive cleaning methods.

PROGRAM

Taking advantage of the capabilities of naturally occurring microorganisms, strategies will be adopted to remove the degradation products present on different alloys commonly found in historical objects.
The microbial mechanisms involved in the uptake of metallic ions and fat degradation will first be deeply investigated over representative corrosion phases and organic substances.
In parallel, to comply with the guidelines when cleaning water-sensitive metallic substrates, bio-based gel systems that present no toxicity will be individuated or specially designed to develop biocleaning methodologies.
Hence, different combination of bio-based gels amended with microbial extracts will be tested on model metal coupons presenting different types of corrosion and/or organic coatings encountered on contemporary or decorative artworks.
The proposed cleaning formulations will then be applied and assessed on real artefacts with emblematic alteration features related to corrosion or the presence of degraded protective coatings.

RESULTS

Within this project, we will develop innovative and eco-friendly formulations for the cleaning of altered copper, iron and silver surfaces, in particular of contemporary art and decorative arts. We propose here a more reliable and conscious conservation practice that would lead to decreased risks for artworks, operators and environment.

Fig. : naturally corroded copper plate : top-left half untreated, bottom-right half treated with fungi.

Fig. : steel plates artificially corroded : on the left untreated, on the right treated with bacterial metabolites.

FUNDING

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PARTNERS

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DURATION

48 months
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