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In outdoor environment, bronze statues undergo degradations mainly caused by water but also related to air pollution[1]. These degradations lead to physical and aesthetic modifications of the work's patina[2]. To limit these changes environment/patina interactions should be reduced. Several treatments can be applied on the statue: microcrystalline waxes[3] or corrosion inhibitors. For the latter, we've decided to understand the protection mechanisms of carboxylates solutions (HC_{10}) which are non-toxic and non-carcinogenic[4]. Nowadays the efficiency of these treatments has not been consistently evaluated.

The aim of this presentation is to present a methodology in order to study the penetration of organic treatments within the patina layers and to evaluate the protective ability of the treatment and compare it to more classical ones.

First treated samples have been characterized by µ-Raman spectroscopy and NRA analyses and the results reveal the influence of the application mode on the treatment's penetration in the patina layer.

In a second time re-corrosion experiments by immersion in D_2O and relative humidity cycles simulation with D_2O and ^{18}O have been performed on treated samples. Thanks to the ToF-SIMS analysis it has been shown that both treatments have a protective effect against water penetration in immersion conditions. In parallel thanks to NRA analyses the efficiency of both treatments against the formation of new phases have been shown when treated and non treated samples are compared.

Finally aging tests by UV and leaching degradation were carried out on treated samples and show an absence of degradation under UV for the HC_{10} treatment and an efficiency against leaching depending on the application mode.

These results tend to show a much lower protective effect for samples treated with microcrystalline wax than samples treated with decanoic acid under environmental solicitations.

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