

Electroplated Quandaries

Treatment and Analytical Insights



WINTERTHUR



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INTRODUCTION

Silver-plated objects are comprised of base metal substrates with thinly deposited silver that is highly prone to abrasion. Here we present our findings from a silver-plate cleaning study. This research is part of a two-year Silver lacquering campaign at Winterthur Museum.



Silver is most commonly polished with a mild abrasive to remove silver sulfide, otherwise known as tarnish. However, abrasive polishing permanently removes the most superficial layers of the metal.

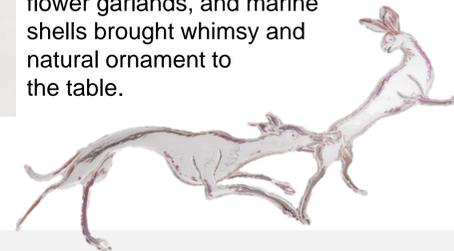


Kettle, ca. 1850-1900
Probably made in England, or the US
Electroformed silver-plated copper

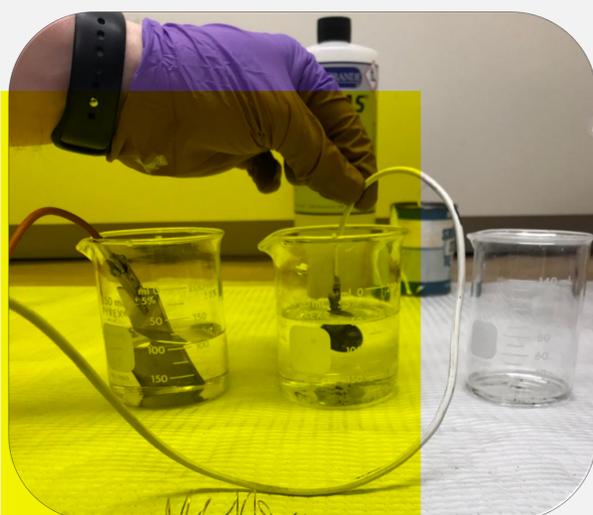


Detail showing heavily worn silver surface with medium tarnish forming through a failing 32 year-old lacquer coating.

The lively lines of design and low relief decoration on the handle and body were made in the rocco style when such birds, flower garlands, and marine shells brought whimsy and natural ornament to the table.



PROCEDURE



In order to find a method to remove tarnish from the thin, silver-plated surface, conservation assistants started the experiment by electroplating 15 copper coupons.



5 cleaning solutions were chosen based on common silver-cleaning practices.

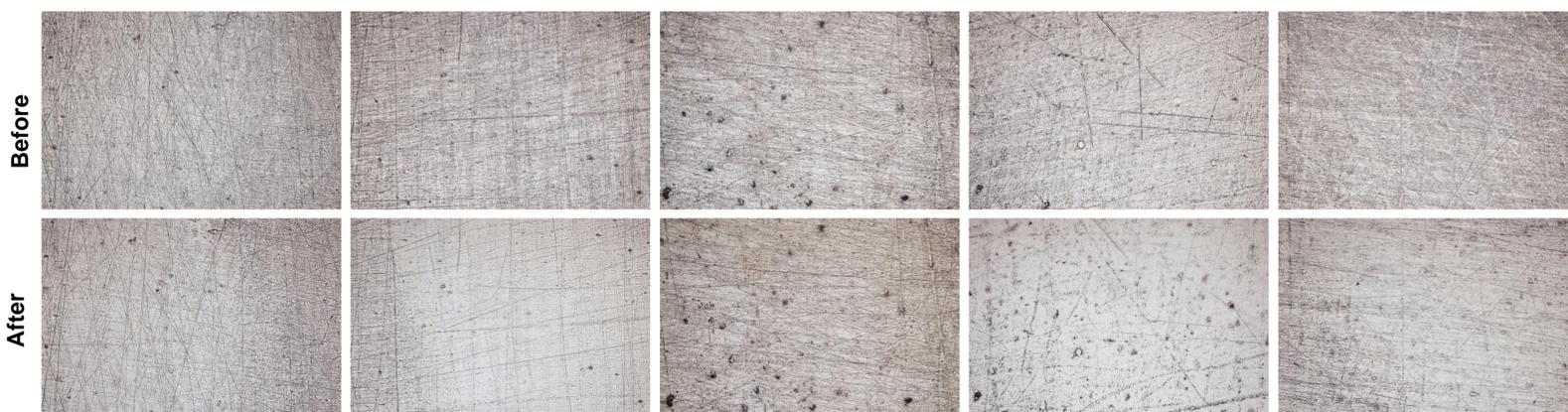


Using XRF, the thickness of silver-plate could be semi-quantified because α and β K lines from copper peaks are absorbed differently by the silver-plate.

PHOTOMICROGRAPHS at 100x



Photomicrographs of the silver-plated coupons from before and after cleaning show the effects of the different products tested.



1. Calcium Carbonate Slurry
Somewhat reduces scratches but also adds new scratches to the surface.

2. Dilute Calcium Carbonate
Significant reduction of scratches observed under magnification. Some new scratches may be present.

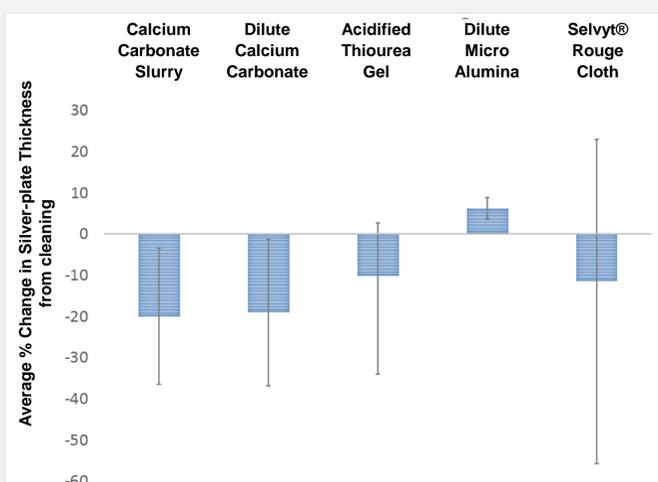
3. Acidified Thiourea Gel
No alteration in the scratch pattern observed. Thiourea creates a yellowed, matte surface.

4. Dilute Micro Alumina
Reduces surface scratches by burnishing the silver. No new scratches observed.

5. Selvyt® Rouge Cloth
Photomicrographs indicate significant scratch reduction. ***

XRF RESULTS

Treatments 1, 2, 3 and 5 removed silver, on average, by up to 20%. The only treatment which did not was the dilute micro alumina. However, there is significant variation in these results which is likely due to the difference in pressure applied, speed of polishing, evaporation of carrier fluid and the presence of tarnish on the carrier cloth during polishing.



CONCLUSION



Given the results of the experiment, tarnish on the kettle was locally removed with dilute micro alumina. For this particular object, the potential for a highly reflective, burnished surface was acceptable.

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