

## Electrochemical Cleaning of Silver Wire Electrodes

This method is designed to be effective yet gentle on the electrode, avoiding any mechanical stress that might be caused by traditional polishing methods.

Based on: Palomar, T.; Ramírez Barat, B.; García, E.; Cano, E. A Comparative Study of Cleaning Methods for Tarnished Silver. *Journal of Cultural Heritage* **2016**, *17*, 20–26.

<https://doi.org/10.1016/j.culher.2015.07.012>.

### Materials Required:

1. Potentiostat
2. Ag spiral helix electrode
3. Silver/Silver Chloride (Ag/AgCl) reference electrode
4. There are two possible electrolyte solutions which can work:
  - 0.1 M sodium nitrate ( $\text{NaNO}_3$ ) or
  - 0.1 M sodium bicarbonate ( $\text{Na}_3\text{H}(\text{CO}_3)_2$ ).

### Procedure:

1. Prepare two separate electrolyte solutions: one with 0.1 M  $\text{NaNO}_3$  and the other with 0.1 M  $\text{Na}_3\text{H}(\text{CO}_3)_2$ .
2. Potentiostatic Reduction:
  - Set the potentiostat to a fixed potential of -1 V (versus Ag/AgCl).
  - Submerge the silver wire electrode in one of the prepared electrolyte solutions.
  - Perform the potentiostatic reduction for 350 seconds.
  - This step ensures the complete reduction of corrosion products on the electrode without causing hydrogen evolution.
3. Repeat the process using the other electrolyte solution if desired.
4. Post-Cleaning:
  - After cleaning, carefully remove the electrode from the solution.
  - Rinse the electrode with distilled water and dry it thoroughly.

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**17<sup>th</sup> November 2023**

### NOTICE:

*The declaration is made under penalty of perjury for making a false statement and under penalty of financial liability.*