



GOLD ELECTROPLATING

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1 Purpose

This SOP describes how to use the Rodgers RLE Lab electroplating apparatus for gold plating.

2 Safety

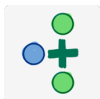
This process must be conducted with the electro cleaner and gold plating solutions in a fume hood. The operator must wear nitrile gloves or other gloves suited to resist highly acidic or basic solutions. The operator must wear safety glasses. The operator must wear long pants and closed-toed shoes. It is recommended that the operator wear vinyl or polyester chemical protective sleeves.

3 Parts and Materials

- 3.1 Two WEP DC Power Supplies
- 3.2 Two Lab Fish heater/stirrer units (w/ two magnetic stir bars if desired)
- 3.3 Six 1 L glass beakers
- 3.4 Two stainless steel strips
- 3.5 Two sets of alligator clip power supply leads
- 3.6 Electro-cleaning solution (under-hood storage)
- 3.7 Hydrochloric acid, 30% (if desired) (under-hood storage)
- 3.8 TWL B1-RL 24 Kt Gold Plating Solution (under-hood storage)
- 3.9 Distilled water (large 5-gallon bucket and/or 1 gallon jugs)
- 3.10 Copper wire (under-hood storage)
- 3.11 Part(s) to be plated

4 Tools

In the Rodgers sanding and polishing drawer there is a variety of coarse, fine and very fine sandpaper, as well as polishing pads, if desired. In the lapping drawer there is a lapping plate and some 4 um garnet lapping paste, if desired.



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5 Summary

- 5.1 Turn on heat/stir plates to warm up solutions
- 5.2 Polish and pre-clean your part
- 5.3 Electro-clean and rinse your part
- 5.4 Acid wash and rinse your part if desired
- 5.5 Plate and rinse your part
- 5.6 Clean and rinse and blow-dry your part

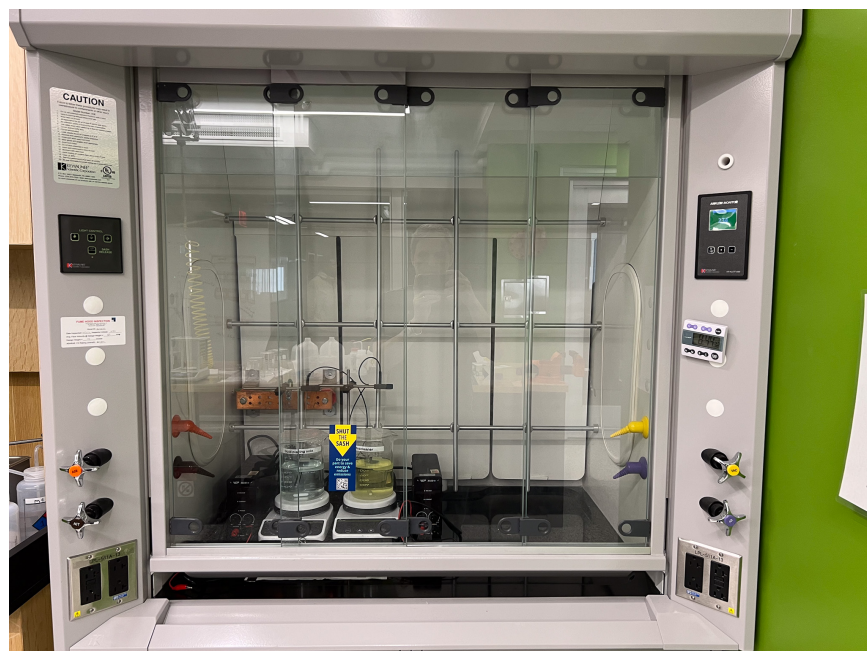


Figure 1: The Rodgers RLE Lab chemical hood.



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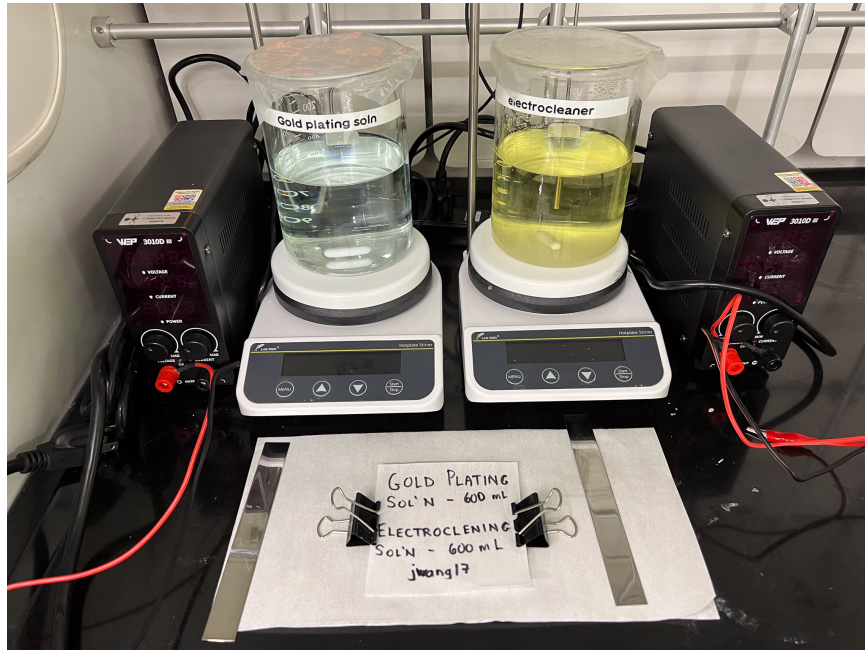


Figure 2: The electroplating setup.



Figure 3: Source bottles for extra electro-cleaner and plating solution.

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Protocol

- 5.7 Locate all necessary materials
- 5.8 Turn on stirring hot plates (switch is at front right)
 - 5.8.1 Electro-cleaner set to 50 C and 50-200 rpm
 - 5.8.2 Gold plating solution set to 46 C and 50-200 rpm
- 5.9 Sand and polish your parts, if desired, to remove excess dirt and oxidation, as well as to provide a smooth surface for electroplating
- 5.10 Clean your parts with Alconox detergent to remove residual polish debris
 - 5.10.1 If you did not polish or sand your part, you might be able to skip this step
- 5.11 Clean your parts in IPA
 - 5.11.1 Sonicate parts in IPA for 1 min
 - 5.11.2 Rinse in fresh IPA
 - 5.11.3 DI water rinse using 3 beakers, cycle baths for each 1-2 parts
- 5.12 If repeating for many parts, after 2-3 parts refresh your rinse beakers
 - 5.12.1 Empty the first bath
 - 5.12.2 Pour the second bath into the first
 - 5.12.3 Pour the third into the second
 - 5.12.4 Refill the third bath
- 5.13 Electro-clean
 - 5.13.1 Attach stainless steel electrode to the positive power supply terminal, place inside cleaning beaker by hanging on the beaker rim
 - 5.13.2 Set power supply voltage to 5 V and set current limit to 1.5 A.
 - 5.13.3 Attach your part to, or hang it, on wire (preferably copper) and attach the wire to the negative terminal
 - 5.13.4 Either be ready to dip your part into the electro-cleaner for the desired time or (preferred) find a way to hang the part so that it is fully-submerged
 - 5.13.5 Set timer for desired time (1 minute default) and either turn on the power supply for that amount of time, or dip the part if you are not hanging it
 - 5.13.6 Watch the voltage level. If it dips below 5 V, then increase the current limit until the voltage is again 5 V. The required current limit is a function of both the voltage setting and the electrically-active surface area of your part.
- 5.14 DI water rinse using 3 beakers, cycle baths for each 1-2 parts
- 5.15 Clean off any remaining electro-cleaner



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- 5.15.1 Dip part in 30% HCl
- 5.15.2 15 seconds should be enough
- 5.15.3 Move the sample around while in the acid
- 5.16 Rinse in DI water using 3 beakers, cycle baths for each 1-2 parts
- 5.17 Gold plate
 - 5.17.1 Attach stainless steel electrode to the positive power supply terminal, place inside plating beaker by hanging on the beaker rim
 - 5.17.2 Set power supply voltage to 5 V and set current limit to 1.5 A.
 - 5.17.3 Attach your part to, or hang it, on wire (preferably copper) and attach the wire to the negative terminal
 - 5.17.4 Either be ready to dip your part into the plating solution for the desired time or (preferred) find a way to hang the part so that it is fully-submerged
 - 5.17.5 Set timer for desired time (1 minute 30 seconds default) and either turn on the power supply for that amount of time, or dip the part if you are not hanging it
 - 5.17.6 Watch the voltage level. If it dips below 5 V, then increase the current limit until the voltage is again 5 V. The required current limit is a function of both the voltage setting and the electrically-active surface area of your part.
- 5.18 Rinse in DI water using 3 beakers, cycle baths for each 1-2 parts
- 5.19 Rinse in IPA
 - 5.19.1 Blow off with nitrogen or allow to air dry

6 Inspection

Check your part and the quality of the film under one of the stereo-microscopes. If the quality is not great, it is likely that you need to refine the polishing and cleaning steps 5.9 through 5.11.

7 Revision History

<i>Document Number</i>	<i>Rev</i>	<i>Change comments</i>	<i>Reviser</i>	<i>Date</i>
SOP-0001	v1.0	Initial release	S. Nagle	2023.10.25
	v1.1	Added voltage and current setting guidance.	S. Nagle	2024.02.27