Product Description

An exceptional, eco-friendly immersion gold solution formulated to provide a thin, even, and robust surface finish when used in conjunction with *LILO-CuBL™*. Additionally, it grants users tight, uniform thickness control.

Features

- Cyanide free
- Increased solder joint strength
- Free of strong chelates (e.g. EDTA)
- Controlled plating thickness and uniformity
- High tolerance to contaminants
- No decrease in plating performance even after 5+ metal turnovers

Reminder: Make sure to have both *LILO-ImmAu™* and *LILO-Au Replenish™* at your plating facility.

Health & Safety

Before using this product always refer to the Safety Data Sheet (SDS) provided with *LILO-ImmAu™* for details on recommended handling precautions, and product storage.

FIRST AID - IF IN EYES: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

IF ON SKIN (or hair): Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

IF SWALLOWED: DO NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

IF INHALED: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

IN CASE OF SPILL - Wear respiratory protection. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided. Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

Product Information	
Typical Application:	Printed Circuit Board (PCB) plating, Semiconductor industry applications, etc.
Lower gold consumption & improved solder joints performance (achieved in combination with ENIG-Premium™ products)	
Data	
International Compliance	IPC 4552 (ENIG standard)
Appearance	Slightly transparent, dark yellow liquid.
Deposition Thickness	6-8min in *LILO-ImmAu™* yields a **2µin. ±10%** (**50nm ± 10%**) gold surface *(compliant to IPC 4552)*
Temperature Range	80-90°C / 176-194°F (Recommended: **85°C/185 °F**)
pH	2-3 pH at 25°C
Specific Gravity	0.4-0.6
Bath Life	5+ MTOs
Filtration Porosity	5-10µm

Operation Notes

- Use in concentration supplied.
- Filtration during plating is recommended (may affect surface thickness due to agitation)
- Filtration and agitation are recommended throughout the plating process to maintain solution performance and plating appearance.
- Exposure to foreign/external **metal devices** should be kept to a minimum or avoided completely (e.g. metal thermometers, metal clamps, mixers, digital controllers, etc.).
- If a metal device is exposed or immersed in the solution rinse with deionized (DI) water and dry with inert material immediately.

Operation Parameters

- Gold compound concentration in the solution should be no less than **0.75g/L** (equivalent Gold metal concentration 0.36 g/L) to ensure plating performance (**Gold compound concentration = 2.09 X Gold concentration in solution using XRF or AAS**).
- Recommended gold compound concentration in the solution is **0.8-1.2g/L**
- *Use between **80-90°C / 176-194°F** (Recommended: **85°C/185 °F**)*

Bath Maintenance

- Proper filtration between plating sessions (5µm mesh size/porosity recommended).
- Gold compound concentration is maintained above **0.75g/L (Gold metal conc. 0.36g/L)**.
- Water level is maintained throughout plating process.

Bath Analysis

- Bath analysis of LILO-ImmAu is a key step in proper bath maintenance
- The most common methods to check gold concentrations in LILO-ImmAu solution are X-Ray Fluorescence (XRF) or Atomic Absorption Spectroscopy (AAS)
- **X-Ray Fluorescence (XRF)**: A non-destructive analysis technique where the sample is exposed with X-rays from a source and information on the elemental composition is measured by the fluorescent (or secondary) X-rays emitted from the sample
- **Atomic Absorption Spectroscopy (AAS)**: A destructive analysis technique where the sample is atomized into a gaseous state and the quantity of chemical elements is determined by the absorption of optical radiation (light)
- Use data from a calibrated XRF or AAS to find concentrations of metal constituents of LILO-ImmAu solution and replenish accordingly

Bath Replenishment

- Check gold (gold content ~48% in the gold compound) concentrations in LILO-ImmAu solution with XRF or AAS, then replenish accordingly
- Check water level of LILO-ImmAu solution regularly or use a water-level controller
- See **Addendum 1** for full details on *LILO-ImmAu™* replenishment

Cosmetic Information

- The chemistry of *LILO-ImmAu™* causes the gold finish to appear rose gold and very thin *(compliant to IPC 4552)*. Note: Alternate offerings with Cyanide based gold solutions leave a yellow-matte finish of gold
- Stains/striations **on the surface** of gold are typically caused by organic contaminants present in the gold solution from lack of/improper filtration and agitation
- Stains, striations, water marks, and other cosmetic flaws that appear **under** the gold surface may be visible because of the type of chemical reaction taking place. The presence of these stains is not caused by *LILO-ImmAu™* plating, but rather improperly plated or unclean metal underneath
- Having a DI Rinse then using Nano Cleaner 1080™ after *LILO-ImmAu™* will achieve optimum cosmetic results

Storage

- Avoid contact with eyes and skin. Avoid inhalation of vapor or mist.
- Keep container tightly closed in a dry and well-ventilated place at 20-35 ˚C /68-95 ˚F.
- Containers which are opened must be carefully resealed and kept upright to prevent leakage.
- Store in a cool, dry area in accordance with all current regulations and standards.

Disposal

NEVER POUR SOLUTION INTO PUBLIC WASTEWATER SYSTEMS
(e.g. Sinks, drains, toilets, etc.)

Product:
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging:
Dispose of as unused product.

Disclaimer

Review the TERMS AND CONDITIONS GOVERING SALES document for LiloTree regarding all product and warranty information.

We provide support for our ***Ni-ENIG-Premium™*** products within our terms and conditions from our Redmond office.

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Addendum 1: *LILO-ImmAu™* Replenishment

Equipment

- 5ml or 10ml pipette
- 100ml plastic beaker/container (XRF) or volumetric flask (AAS)

Reagents

- *LILO-ImmAu Replenish™*

Procedure

1) Calibrate AAS or XRF using recommended standards.
2) Review the parameters of your AAS or XRF to determine the appropriate volume of a bath sample to use.
3) Using the pipette measure out the appropriate volume of LILO-ImmAu and dispense into a 100ml beaker/volumetric flask.
4) Following the appropriate operating procedure for either AAS or XRF measure the gold content of the sample.
5) Record the AAS or XRF results (this can help users predict and estimate their usage).
6) Assess the current gold compound concentration of LILO-ImmAu from the AAS or XRF results (gold content ~48% in the gold compound) and calculate the required replenishment needed to bring the solution to ~1g/L (3.8g/gal.) gold compound concentration (gold compound concentration = 2.09 **X** gold metal concentration in g/L measured by AAS or XRF)

Calculation Data

- Find the amount of replenishment solution needed using the equation:

$$(\mathbf{1} - (\mathbf{2.09}\ \boldsymbol{X\ Concentration\ of\ Au\ in\ g/L})) \times \mathbf{10} \times\ \boldsymbol{Volume\ of\ tank}\ (\boldsymbol{liters}) = \boldsymbol{mL\ of\ LILO - ImmAu\ Replenish\ Needed}$$

Replenishment

1) Measure the appropriate amount of *LILO-Au Replenish™* calculated in the previous steps and dispense into the 500ml glass beaker in order to heat the required LILO-Au Replenish content to **80°C /176°F.**

2) Make sure the *LILO-ImmAu™* bath is heated to at least **80°C /176°F**. **Also,** heat the *LILO-Au Replenish™* solution to **80°C /176°F**. This is an <u>important</u> step in the replenishment process. Failure to do so may cause non-uniform dissolution of the replenishment solution into *LILO-ImmAu™* which may require extended agitation to fix.

3) Once the replenishment solution is properly heated, carefully pour the measured *LILO-Au* Replenish solution into the tank containing *LILO-ImmAu™*.

4) Agitate the solution once all the replenishment has been added to ensure uniform dissolution.

Examples/Quick Reference

Gold Concentration	Total Volume	*LILO-Au Replenish* required
0.4 g/L	95 liters	155 mL
0.375 g/L	190 liters	408.7 mL
0.45 g/L	379 liters	224.9 mL