

SOP 0002 COPPER PLATING

MODE OF OPERATION: Check the blank before each procedure with a pencil if it is done. Mark the changes you made to the procedures with a pencil.

- __1) The part is degreased using an aqueous solution (organic solvent).
- __2) The physical soils are removed in an ultrasonic cleaning bath.
- __3) Water wash.

The steps (a-d) may be used to clean stainless wafers thoroughly.

__a) Electroclean anodically.

__b) Water wash.

__c) Anodically etch in:

Sulfuric acid, H ₂ SO ₄ (density 1.84 g/cm ³)	205 mL
Water	To 1 L
Temperature	Below room temperature
Current density	200A/ft ² (range 175 to 250 A/ft ²)
Duration	30 s to 5 min
Cathode	Lead 7% tin-93% lead alloy
Tank	PVC/rubber-lined tank

__d) Water wash thoroughly.

- __4) Metal-oxide films are removed by strong acids.

Immerse in:

Hydrochloric acid, HCl (concentrated)	1 mL
Sulfuric acid, H ₂ SO ₄ (concentrated)	10 mL
Water	To 1 L
Temperature	Room temperature
Duration	30 to 45 s
Tank	PVC/rubber-lined tank

- __5) A thin metal "strike" is electro-deposited upon the part to improve adhesion.

Copper sulfate, CuSO ₄ · 5H ₂ O	0.4 g
Hydrochloric acid, HCl (concentrated)	1 L
Temperature	Room temperature
Duration	3 min (range 1 to 5 min)
Anode	Nickel/graphite/carbon
Tank	PVC/rubber-lined tank

Cathodically at 50 A/ft² for 2 min and then at 15 A/ft² for 2 min.

- __6) Water rinse thoroughly.

- __7) After striking, the part is copper plated with a pyrophosphate copper bath.

Copper pyrophosphate, Cu ₂ P ₂ O ₇ · 3H ₂ O	62-106 g/L
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Potassium pyrophosphate, $K_4P_2O_7$	285-475 g/L
Ammonium nitrate, NH_4NO_3	7-14 g/L
Ammonia, NH_3	1-3 g/L
Water	To 1 L (pH 8.2 to 8.8)
Ratio of pyrophosphate to copper	7:1 to 8:1
Temperature	50 to 60 °C.
Anode	
Tank	PVC/rubber-lined tank

Cathodically at 75% of the full current load, allow the job to warm up, and raise the current to the full value (10 to 75 A/ft²) for the time duration according to the thickness of deposited copper.

The ratio of pyrophosphate to copper, the pH, and ammonia are monitored. If the pH is higher than recommended, it is lowered by adding 100mL/L sulfuric acid; if it is lower, it may be raised by adding 100 g/L potassium hydroxide (KOH) solution. Ammonia is added to the extent that its odor can be distinguished in the bath.

- __8) Water rinse thoroughly.
- __9) Dip in 20 g/L sodium hydroxide (NaOH) solution at around 60 C.
- __10) Thoroughly rinsed with water.
- __11) Dry.
- __12) Bake at 190 °C (range 150 to 250 °C) for 2 h (range 1 to 3 h) in the case of high-carbon stainless steel.