

INTERLINK™ 9200 Copper TSV

For Advanced Packaging Applications

Regional Product Availability

- North America
- Japan/Korea
- Asia
- Europe

Description

INTERLINK™ 9200 Copper is designed for through-silicon via (TSV) plating with rapid via-filling speeds and low wafer overburden. INTERLINK™ 9200 Copper is a three component organic additive system with a wide dosing window to enable process robustness, while minimizing post-plating CMP by reducing the amount of electroplated Cu on the wafer surface. Cu deposits from INTERLINK™ 9200 Copper are highly pure, preventing any voiding during annealing and allowing high performance devices. Long bath life and process stability is achieved with INTERLINK™ 9200 Copper, allowing uniform via filling speeds throughout the bath life.

Advantages

- Fast via filling rates, less than 1 hr. for 10×100 µm vias, less than 20 min. for 5×50 µm vias
- Long bath life & stable plating performance for greater than 40 Ahr/L with no change in deposit quality
- Pure & bright Cu deposits
- All components analyzable by CVS

Deposit Data

Conductivity:	0.65 MS/cm
Deposit Density:	8.93 g/cm ³
Deposit Impurities:	<5 ppm C, N, O, S, Cl ⁻ each

Bath Make-Up

Note: Please read the INTERLINK™ 9200 Safety Data Sheets (SDS) and use adequate ventilation before handling any product.

1. Clean the equipment per the tool manufacturer's recommended procedure or see below for general cleaning instructions.
2. Fill system anolyte reservoir tank with the required amount of the INTERLINK™ 9200 Anolyte solution.
3. Fill system catholyte reservoir tank with the required amount of the INTERLINK™ 9200 Electrolyte solution.
4. To film the copper anode (phosphorous content 0.02–0.06%), use a 90 minute burn-in at 10–15 mA/cm² with the electrolyte solution only. Alternatively, follow the recommended procedure provided by the tool manufacturer. Anode conditioning for a new bath is critical for optimizing plating performance as well as stabilization of bath additives.
5. Add the required amount of INTERLINK™ 9200 Suppressor solution.
6. Add the required amount of INTERLINK™ 9200 Accelerator solution.
7. Add the required amount of INTERLINK™ 9200 Leveler solution.
8. Allow the dosed bath to re-circulate throughout the plating tool for 30 minutes.
9. Bring the plating bath up to operating temperature (25°C ±5°C).



Bath Make-Up (cont'd)

INTERLINK™ 9200 Catholyte Solution		
Component	Range	Recommended
Cu ²⁺	57 to 63 g/L	60 g/L
H ₂ SO ₄	8 to 12 g/L	10 g/L
Cl ⁻	72 to 88 mg/L	80 mg/L
INTERLINK™ 9200 Accelerator	2.4 to 3.6 mL/L	3 mL/L
INTERLINK™ 9200 Suppressor	4.8 to 7.2 mL/L	6 mL/L
INTERLINK™ 9200 Leveler	2.8 to 4.2 mL/L	3.5 mL/L

Operating Parameters

Plating Tool

Available for use on any plating tool. Use of a membrane system is recommended.

Temperature

25 to 30°C (77 to 86°F), 25°C recommended

Membrane

Use of a Nafion membrane to separate the catholyte and anolyte is recommended to enhance plating bath stability and minimize organic additive consumption.

Bath Maintenance

Inorganic Components

1. Copper Sulfate

The concentration of copper sulfate is measured by titration. When the copper sulfate content becomes low, a burn tends to occur in high current density areas. When it becomes too high, crystallization of CuSO₄•5H₂O will form in the plating cell.

2. Sulfuric Acid

Sulfuric acid provides a plating solution with conductivity. The concentration of sulfuric acid can be measured by titration. If the sulfuric acid concentration becomes too low, deposit uniformity will degrade.

3. Chloride

Chloride is necessary to promote the deposition reaction at the cathode. Chloride content can be measured with titration. Chloride is typically adjusted by the addition of hydrochloric acid. When the chloride content is less than 70 mg/L, add HCL to bring into specification.

Organics

INTERLINK™ 9200 Accelerator, Suppressor, and Leveler provide the source of organic additives components for the bath. The organic bath components are consumed through solution drag out, solution pumping and the electrode processes. The organic bath components should be added to the bath as needed to maintain the recommended concentrations. Organic additive component replenishment rates are dependent on the operating conditions, tool design, sump volume, and solution agitation. The concentrations of the organic components can be measured by standard cyclic voltammetric stripping (CVS) methods. These methods are available through your metrology tool supplier.

Bath Life/Yield

Bath when properly controlled the plating bath will have an approximate bath life of greater than 40 Ah/L with a 10% bleed & feed. Actual bath life will be dependent on process and wafer parameters.



Cleaning Method of Plating Equipment

When making up INTERLINK™ 9200 for the first time, proper equipment cleaning is necessary.

Cleaning Procedure

1. After disposal of the previous plating solution, fill the equipment with clean DI water and circulate. Discharge the rinsing water and remove any precipitates.
2. Fill the equipment with 50 to 100 g/L of potassium hydroxide or sodium hydroxide and circulate it for at least one hour.
3. Rinse the tank and all lines with DI water thoroughly.
4. Fill the equipment with 50 to 100 g/L sulfuric acid and circulate it for more than one hour.
5. Rinse the tank and all lines with DI water thoroughly.

Associated Products

INTERLINK™ 9200 Electrolyte
INTERLINK™ 9200 Anolyte
INTERLINK™ 9200 Accelerator
INTERLINK™ 9200 Suppressor
INTERLINK™ 9200 Leveler

Handling Precautions

Before using this product, associated generic chemicals or the analytical reagents required for its control, consult the supplier's Safety Data Sheet (SDS) for details on material hazards, recommended handling precautions and product storage.

CAUTION! Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

CAUTION! Failure to maintain proper volume level when using immersion heaters can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

Storage

Store products in tightly closed original containers at temperatures recommended on the product label.

Disposal Considerations

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Electronic Materials Technical Representative for more information.

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