DuPont™ Intervia™ 8540HSP

Electroplating Copper

For Advanced Packaging Applications

Regional Product Availability

- North America
- Japan/Korea
- Asia
- Europe

Description

Intervia™ 8540HSP Electroplating Copper is designed for Cu pillar and redistribution layer plating applications. As a three component system, Intervia™ 8540HSP Copper is able to achieve a finely tuned deposit morphology across a wide variety of Cu pillar feature sizes, while maintaining within-die (WID) and within-wafer (WIW) uniformity. The pillar and RDL trace profile shapes are also tunable by adjusting the dosing of Intervia™ 8540HSP Leveler in the plating bath. The Cu deposits from Intervia™ 8540HSP Copper are highly pure, enabling void-free integration with barrier and solder materials.

Advantages

- Capable of high plating rate for maximizing wafer through-put
- Tunable pillar shapes while maintaining co-planarity performance
- Pure and bright Cu deposits
- Void-free integration with Nikal™ BP Nickel and Solderon™ BP Tin-Silver chemistries
- All components analyzable by CVS

Deposit Data

Conductivity:	0.50 MS/cm
Deposit Density:	8.9 g/cm
Within-die (WID) uniformity:	<5%
Within-wafer (WIW) uniformity:	<10%
Surface Profile:	Dished to Flat to Domed, dependant of leveler dosing
Deposit Impurities:	<5 ppm C, N, O, H, S, Cl each

Bath Make-Up

The make-up procedure of Intervia™ 8540HSP Copper:

1. Add 900 mL/L of Intervia™ 8508.
2. Dummy plate at 2 to 3 A/dm^2 for approximately two hour in the inorganics only to establish stable black film on the anode.
3. Add Intervia™ 8540HSP Suppressor and mix well.
4. Add Intervia™ 8540HSP Leveler and mix well.
5. Add Intervia™ 8540HSP Accelerator and mix well.
6. Dilute to volume with Intervia™ 8508 and mix well.
7. Dummy plate at 1 A/dm2 for 1–2 hours to confirm uniform plating appearance. If the plating appearance is not uniform, adjust each component and dummy plate for an additional 1–2 hours.
8. Analyze the plating bath and adjust the content of the organic additives.

Intervia™ 8540HSP Solution

Component	Range	Recommended
$CuSO_4 \cdot 5H_2O$	140 to 180 g/L	160 g/L
H_2SO_4	130 to 150 g/L	140 g/L
Cl^-	75 to 85 mg/L	80 mg/L
Intervia™ 8540HSP Accelerator	8 to 12 mL/L	10 mL/L
Intervia™ 8540HSP Suppressor	8 to 12 mL/L	10 mL/L
Intervia™ 8540HSP Leveler	8 to 12 mL/L	10 mL/L

Operating Parameters

Plating Tool

For use in all plating tools. Some optimization on tool may be necessary.

Temperature

25 to 30 °C recommended

Cathode Current Density

Cathode current density is typically 2–15 ASD. Lower current densities will result in better WIW and WID uniformity

Bath Maintenance

Inorganic Components

1. Copper Sulfate

The concentration of copper sulfate is measured by standard titration methods. When the copper sulfate content becomes low, a burn tends to occur in high current density areas. When it becomes too high, crystallization of $CuSO_4 \cdot 5H_2O$ will form in the plating cell along the anode sides.

2. Sulfuric Acid

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

3. Chloride

Chloride is necessary and affects the deposition reaction at the cathode. Chloride content can be measured by standard titration methods. 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

Intervia™ 8540HSP Accelerator, Suppressor, and 8540HSP Leveler provide the source of organic "additive" components for the bath. The organic bath components are consumed through solution drag out, solution pumping and the electrode position process. 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 or upon request from your local DuPont Advanced Packaging Technologies Representative.

Bath Life/Yield

A bath life of greater than 50 Ah/L can be achieved when properly controlled. Actual bath life will be dependent on process and wafer parameters.

Cleaning Method of Plating Equipment

When making up Intervia™ 8540HSP for the first time, proper equipment cleaning is necessary. Please contact your DuPont Advanced Packaging Technologies Representative for more information.

Associated Products

Intervia™ 8508 Solution*

Intervia™ 8540HSP Accelerator

Intervia™ 8540HSP Suppressor

Intervia™ 8540HSP Leveler

* Depending on the plating tool, Intervia™ 8502 Solution (200-100-50) is used instead of Intervia™ 8508 Solution (160-140-80)

Health and Environmental Information

To support customers in their product safety needs, DuPont has an extensive Product Stewardship organization and a team of Product Safety and Regulatory Compliance (PS&RC) specialists available in each area. For further information, please see our website, www.dupont.com, or consult your local DuPont representative.

Safe Handling Information

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ PRODUCT AND MATERIAL SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. FOR MATERIAL SAFETY DATA SHEETS, CONTACT YOUR LOCAL DUPONT SALES OFFICE.

Storage

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

For more information on DuPont™ Intervia™ 8540HSP or other DuPont products, please visit our website.

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