PALLAMET™ 500 Palladium-Nickel

For Electronic Finishing Applications

Regional Product Availability

- North America
- Asia-Pacific

Description

The PALLAMET 500 Palladium-Nickel electrolyte produces bright, ductile palladium-nickel deposits of approximately 80% Pd/20% Ni from a sulfate-based (chloride-free) system. The nearly neutral pH of the plating solution can be run at higher temperatures and lower palladium concentrations, improving the properties of the deposit and a stable bath operation.

The palladium-nickel deposits produced from the PALLAMET 500 Palladium-Nickel electrolyte demonstrate low internal stress and exhibit low porosity. PALLAMET 500 Palladium-Nickel plating solution can be utilized for reel-to-reel applications with different cell designs (i.e., control depth, spot tool).

Advantages

- Near neutral pH, sulfate bath eliminates costly equipment/anode requirements
- Stable alloy composition over wide range of current density and plating conditions
- Simple analytical procedures for all bath components
- Excellent ductility and low internal stress
- Excellent wear resistance
- Low, stable contact resistance when used with a thin gold flash topcoat

Deposit Properties

Alloy:	70–90% palladium, 30–10% nickel
Density:	10.8 g/cc for 80% Pd/20% Ni; determined by alloy composition
Hardness:	350–450 Kn_{25}
Tensile Stress:	228–320 MPa (33–46 Kpsi)

Recommended Process Cycle

1) RONACLEAN™ Cleaners
2) ACTRONAL™ acid activation
3) NIKAL™ SC Nickel Plating Solution
4) Nickel Activation: RONATAB™ Acid Activator PC-1
5) PALLAMET 500 Palladium-Nickel Electrolyte
6) RONOVEL™ C Cobalt-Alloyed Gold/AUROSPEED™ CVD Cobalt-Alloyed Gold Electrolyte
7) Dry

Bath Make-up

Chemicals Required

PALLAMET™ 500 Make-up Solution

PALLADURE™/PALLAMET Palladium Salt

PALLAMET 500 Ni Concentrate (100 g/l Ni)

PALLAMET 500 Additive

PALLADURE Anode Depolarizer

Refer to specific plating application for exact quantities of bath make-up chemicals

Make-up Procedure

1) Add PALLAMET 500 Make-up Solution to a clean tank.
2) Add PALLADURE/PALLAMET Palladium Salt and mix thoroughly.
3) Add PALLAMET™ 500 Nickel Concentrate (100 g/l Ni) and mix thoroughly.
4) Add PALLAMET 500 Additive and mix thoroughly.
5) Dilute to final volume with distilled or deionized water.
6) Measure and adjust pH to 7.1–7.3. To raise pH, use ammonium hydroxide. To lower pH, use reagent grade sulfuric acid. Solution should be clear and blue-green or dark green in color.

High Speed Applications—Bath Make-up

Chemicals Required	Metric	(U.S.)
PALLAMET 500 Make-up Solution	750 ml/l	(75% v/v)
PALLADURE/PALLAMET Palladium Salt	77 g/l	(10.3 oz./gal.)
PALLAMET 500 Nickel Concentrate (100 g/l Ni)	120 ml/l	(12% v/v)
PALLAMET 500 Additive	10 ml/l	(1% v/v)

Bath Operation—Metric

Parameter	Range	80% Pd/20% Ni Alloy
Palladium Metal	15–40 g/l	30.0 g/l
Nickel Metal	7–20 g/l	12 g/l
Palladium to Nickel Ratio	1.0–2.5:1	2.0:1
Temperature	35–55°C	50°C
Specific Gravity	1.090–1.142	1.107
pH	7.0–7.5	7.2
Agitation	Mechanical plus solution movement	
Cathode Density	5–50 A/dm^2	
Deposition Rate	0.05 microns per second at 10 A/dm^2 0.026g of alloy per ampere minute	

Bath Operation—U.S.

Parameter	Range	80% Pd/20% Ni Alloy
Palladium Metal	2.0–5.3 oz./gal.	4.0 oz./gal.
Nickel Metal	0.9–2.7 oz./gal.	1.6 oz./gal.
Palladium to Nickel Ratio	1.0–2.5:1	2.0:1
Temperature	95–130°F	122°F
Specific Gravity	12–18° Baumé	14° Baumé
pH	7.0–7.5	7.2
Agitation	Mechanical plus solution movement	
Cathode Density	50–500 A/ft^2	
Deposition Rate	2 microinches per second at 100 A/ft^2 0.026g of alloy per ampere minute	

Bath Maintenance

PALLAMET™ 500 Make-up Solution

PALLAMET 500 Make-up Solution contains the basic conductivity salts.

PALLADURE™/PALLAMET Palladium Salt

PALLADURE/PALLAMET Palladium Salt is the source of palladium metal for the PALLAMET 500 Palladium-Nickel Plating Bath. To raise palladium metal concentration by 1.0 g/l, add 2.56 g/l PALLADURE/PALLAMET Palladium Salt.

PALLAMET™ 500 Nickel Concentrate (100 g/l Ni)

PALLAMET 500 Nickel Concentrate (100 g/l Ni) is the source of nickel metal for the PALLAMET 500 Palladium-Nickel Plating Bath. The nickel concentration is controlled by wet analysis or AA. To raise nickel metal concentration by 1.0 g/l, add 10.0 ml/l PALLAMET 500 Nickel Concentrate (100 g/l Ni).

PALLAMET 500 Additive

PALLAMET 500™ Additive contains the active brightener required for optimum deposit bright range, maximum deposit ductility, low internal stress and minimum deposit porosity.

PALLAMET 500 Replenisher

PALLAMET 500 Replenisher contains the active conductivity components required during operation to maintain deposit uniformity. For every 100g of alloy deposited (3,800 A-min), add 600 ml of PALLAMET 500 Replenisher. Control by analytical procedure.

PALLADURE Anode Depolarizer

PALLADURE™ Anode Depolarizer is used as required to minimize anode filming. Add up to 10 ml/l PALLADURE Anode Depolarizer in 2 ml/l increments as necessary.

pH

Ammonium hydroxide is used to raise solution pH. The quantity of ammonium hydroxide required is dependent upon operating temperature and pH. If the need for lowering the solution pH is ever encountered, use a 50% v/v solution of reagent grade sulfuric acid.

Product Data

For the specific Product Data values, please refer to the Certificate of Analysis provided with the shipment of the product(s).

Associated Products

PALLAMET™ 500 Make-up Solution
PALLADURE/PALLAMET Palladium Salt
PALLAMET 500 Nickel Concentrate (100 g/l Ni)
PALLAMET 500 Additive
PALLAMET 500 Replenisher
PALLADURE Anode Depolarizer

Equipment

Tanks:	Koroseal-lined, PVDC, polypropylene or other suitable plastics
Anodes:	300 series Stainless Steel
Heaters:	Immersion quartz, stainless steel or PFTE fluoropolymer heaters
Filtration:	1 micron filters with a pump capacity for a minimum of four solution turnovers per hour

Equipment Preparation

Prior to make-up, the process tank and ancillary equipment should be thoroughly cleaned and then leached with an ammonium hydroxide solution.

This procedure is particularly important for new equipment or equipment previously used for other processes.

I. Cleaning Solution

a) Trisodium Phosphate: 15 g/l (2 oz./gal.)

b) Sodium Hydroxide: 15 g/l (2 oz./gal.)

II. Neutralizing Solution

Sulfuric Acid: 50 ml/l (5% v/v)

III. Leaching Solution

Ammonium Hydroxide: 50 ml/l (5% v/v)

IV. Procedure

a) Thoroughly wash down tank and ancillary equipment with clean water.

b) Recirculate water through the complete system to remove water-soluble materials.

c) Discard rinse water.

d) Recirculate water through the complete system.

e) Add cleaning solution to the tank, heat to 55–60°C (130–140°F) and recirculate through the complete system.

f) Discard cleaning solution.

g) Add neutralizing solution and recirculate through the complete system.

h) Discard neutralizing solution.

i) Recirculate water through the complete system.

j) Discard rinse water.

k) Add leaching solution and recirculate through the complete system.

l) Leave leaching solution in tank for a minimum of 8 hours.

m) Recirculate leaching solution through the complete system.

n) Discard leaching solution.

o) Recirculate water through the complete system.

p) Discard rinse water.

Handling Precautions

Before using this product, consult the Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on product 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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