ELECTRONIC MATERIALS
PACKAGING AND FINISHING TECHNOLOGIES

PALLADURE 200

PURE PALLADIUM PROCESS

For Electronic Finishing Applications

Regional Product Availability

N. America	Japan/Korea	Asia	Europe
✔		✔	

Recommended Process Cycle

Semiconductor Applications	Connector Applications
Alkaline Electroclean Ronaclean GP-300 LF	Alkaline Electroclean Ronaclean GP-300 LF
Rinse	Rinse
Acid Activation 20% HCl or 10% H_2SO_4	Acid Neutralization 20% HCl or 10% H_2SO_4
Rinse	Rinse
Nickel Plate Nikal SC	Nickel Plate Nikal SC
Nickel Activation Ronatab Acid Activator PC-1	Nickel Activation Ronatab Acid Activator PC-1
Rinse	Rinse
Palladium Plate Palladure 200	Pallamet Palladium- Nickel Strike/Plate Palladure 200 Plate Ronovel Gold Flash
Drag-out Rinse	Rinse
Rinse	Hot Deionized Water Rinse
Dry	Hot Air Dry

DESCRIPTION

The Palladure 200 process is characterized by its ability to produce semi-bright to bright, crack-free, pure palladium deposits suitable for electronic applications from a mildly alkaline, ammoniacal electrolyte.

Typical applications include electronic connectors, printed circuit edge tabs and semiconductor components. For connector applications, the benefits of palladium coatings can be enhanced by using a palladium-nickel underplate. The palladium-nickel/palladium composite exhibits superior corrosion resistance and ductility. The palladium/gold flash composite exhibits excellent wear resistance and is a suitable replacement for hard gold.

For semiconductor components, thin palladium coatings are suitable as a bondable surface, replacing silver on the inner leads and pads of devices, and as a solderable coating on the external leads, replacing tin-lead.

ADVANTAGES

- Low porosity electrodeposits offer excellent protection against base metal/undercoat oxidation and corrosion
- Excellent wire bonding characteristics in semiconductor applications
- Thin coatings function well as a solderable finish
- Low, stable contact resistance and very good wear resistance in connector applications when used in conjunction with a thin gold flash top coat

DEPOSIT PROPERTIES

Pure:	99.9+%
Structure:	Fine grained, equiaxed
Hardness:	200–250 Kn_{25}
Density:	11.8–12.0 g/cc
Tensile Stress:	250–300 MPa (36–43 Kpsi)

BATH MAKE-UP

Refer to specific plating application for exact quantities.

Chemicals Required

Palladure 200 Make-up Solution

Palladure 200 Palladium Concentrate

Palladure 200 Make-up Additive A

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PALLADURE 200 PURE PALLADIUM PROCESS

MAKE-UP PROCEDURE

1. Add Palladure 200 Make-up Solution to tank.
2. Add Palladure 200 Palladium Concentrate and mix thoroughly.
3. Add Palladure 200 Make-up Additive A and mix thoroughly.
4. Dilute to volume with deionized water and mix thoroughly.
5. Check pH and specific gravity and adjust as necessary.

Bath Make-up (Semiconductor Applications) Reel-to-Reel or Cut Strip Plating Equipment—Metric

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	250–500 ml/l	250 ml/l
Palladure 200 Palladium Concentrate (100 g/l Pd)	60–120 ml/l	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	10–20 ml/l	15 ml/l

Bath Make-up (Semiconductor Applications) Reel-to-Reel or Cut Strip Plating Equipment—U.S.

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	25–50% v/v	25% v/v
Palladure 200 Palladium Concentrate (100 g/l Pd)	6–12% v/v	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	1.0–2.0% v/v	1.5% v/v

Bath Operation—Metric

Parameter	Range	Recommended
Palladium Metal	6–12 g/l	8 g/l
Temperature	30–50°C	45°C
Specific Gravity	1.036–1.115	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Moderate solution agitation combined with cathode movement	
Current Density	0.5–10 A/dm^2	
Deposition Rate	0.25 microns per minute at 1 A/dm^2 0.03g per ampere minute	

Bath Operation—U.S.

Parameter	Range	Recommended
Palladium Metal	0.8–1.6 oz./gal.	1.07 oz./gal.
Temperature	100–122°F	115°F
Specific Gravity	5–15° Baumé	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Moderate solution agitation combined with cathode movement	
Current Density	5–100 A/ft^2	
Deposition Rate	10 microinches per minute at 10 A/ft^2 0.03g per ampere minute	

Bath Make-up (Connector Applications) Jet Agitation Selective Cells—Metric

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	150–250 ml/l	250 ml/l
Palladure 200 Palladium Concentrate (100 g/l Pd)	200–300 ml/l	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	10–20 ml/l	15 ml/l

PALLADURE 200 PURE PALLADIUM PROCESS

Bath Make-up (Connector Applications) Jet Agitation Selective Cells—U.S.

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	15–25% v/v	25% v/v
Palladure 200 Palladium Concentrate (100 g/l Pd)	20–30% v/v	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	1.0–2.0% v/v	1.5% v/v

Bath Operation—Metric

Parameter	Range	Recommended
Palladium Metal	20–30 g/l	Dependent upon equipment design and application
Temperature	50–60°C	57°C
Specific Gravity	1.074–1.115	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	High-speed jetting solution	
Current Density	5–75 A/dm²	
Deposition Rate	0.125 microns per second at 30 A/dm² 0.03g per ampere minute	

Bath Operation—U.S.

Parameter	Range	Recommended
Palladium Metal	2.7–4.0 oz./gal.	Dependent upon equipment design and application
Temperature	122–140°F	135°F
Specific Gravity	10–15° Baumé	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	High-speed jetting solution	
Current Density	50–750 A/ft²	
Deposition Rate	5 microinches per second at 300 A/ft² 0.03g per ampere minute	

Bath Make-up (Connector Applications) Controlled Depth Selective Cells—Metric

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	250–500 ml/l	250 ml/l
Palladure 200 Palladium Concentrate (100 g/l Pd)	150–250 ml/l	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	10–20 ml/l	15 ml/l

Bath Make-up (Connector Applications) Controlled Depth Selective Cells—U.S.

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	25–50% v/v	25% v/v
Palladure 200 Palladium Concentrate (100 g/l Pd)	15–25% v/v	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	1.0–2.0% v/v	1.5% v/v

Bath Operation—Metric

Parameter	Range	Recommended
Palladium Metal	15.0–25 g/l	Dependent upon equipment design and application
Temperature	38–50°C	45°C
Specific Gravity	1.074–1.115	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Rapid solution combined with cathode strip movement	
Current Density	0.5–20 A/dm²	
Deposition Rate	2.5 microns per minute at 10 A/dm² 0.03g per ampere minute	

PALLADURE 200 PURE PALLADIUM PROCESS

Bath Operation—U.S.

Parameter	Range	Recommended
Palladium Metal	2.0–3.3 oz./gal.	Dependent upon equipment design and application
Temperature	100–122°F	115°F
Specific Gravity	10–15° Baumé	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Rapid solution combined with cathode strip movement	
Current Density	100 A/ft^2	
Deposition Rate	100 microinches per minute at 100 A/ft^2 0.03g per ampere minute	

Bath Operation—Metric

Parameter	Range	Recommended
Palladium Metal	4.5–12.0 g/l	Dependent upon equipment design and application
Temperature	38–50°C	45°C
Specific Gravity	1.036–1.115	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Mild solution combined with cathode rod movement	
Current Density	0.1–2 A/dm^2	
Deposition Rate	0.25 microns per minute at 1 A/dm^2 0.03g per ampere minute	

Bath Make-up (Connector Applications) Rack—Metric

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	250–500 ml/l	250 ml/l
Palladure 200 Palladium Concentrate (100 g/l Pd)	45–120 ml/l	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	10–20 ml/l	15 ml/l

Bath Make-up (Connector Applications) Rack—U.S.

Chemicals Required	Range	Recommended
Palladure 200 Make-up Solution	25–50% v/v	25% v/v
Palladure 200 Palladium Concentrate (100 g/l Pd)	4.5–12.0% v/v	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	1.0–2.0% v/v	1.5% v/v

Bath Operation—U.S.

Parameter	Range	Recommended
Palladium Metal	0.6–1.6 oz./gal.	Dependent upon equipment design and application
Temperature	100–122°F	115°F
Specific Gravity	5–15° Baumé	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Mild solution combined with cathode rod movement	
Current Density	1–20 A/ft^2	
Deposition Rate	10 microinches per minute at 10 A/ft^2 0.03g per ampere minute	

PALLADURE 200 PURE PALLADIUM PROCESS

Bath Make-up (Connector Applications) Barrel—Metric		
Chemicals Required	**Range**	**Concentration**
Palladure 200 Make-up Solution	250–500 ml/l	250 ml/l
Palladure 200 Palladium Concentrate (100 g/l Pd)	20–70 ml/l	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	10–20 ml/l	15 ml/l

Bath Make-up (Connector Applications) Barrel—U.S.		
Chemicals Required	**Range**	**Concentration**
Palladure 200 Make-up Solution	25–50% v/v	25% v/v
Palladure 200 Palladium Concentrate (100 g/l Pd)	2.0–7.0% v/v	Dependent upon equipment design and application
Palladure 200 Make-up Additive A	1.0–2.0% v/v	1.5% v/v

Bath Operation—Metric		
Parameter	**Range**	**Recommended**
Palladium Metal	2.0–7.0 g/l	Dependent upon equipment design and application
Temperature	38–50°C	45°C
Specific Gravity	1.036–1.115	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Mild solution combined with barrel rotation	
Current Density	0.05–0.7 A/dm²	
Deposition Rate	0.05 microns per minute at 0.2 A/dm² 0.03g per ampere minute	

Bath Operation—U.S.		
Parameter	**Range**	**Recommended**
Palladium Metal	0.3–0.9 oz./gal.	Dependent upon equipment design and application
Temperature	100–122°F	115°F
Specific Gravity	5–15° Baumé	Dependent upon equipment design and application
pH	7.2–7.8	7.5
Agitation	Mild solution combined with barrel rotation	
Current Density	0.5–7 A/ft²	
Deposition Rate	2 microinches per minute at 2 A/ft² 0.03g per ampere minute	

BATH MAINTENANCE

Palladure 200 Make-up Solution

Palladure 200 Make-up Solution contains the basic conductivity salts.

Palladure 200 Palladium Conc. (100 g/l Pd)

To raise palladium concentration by 1.0 g/l, add 10.0 ml/l of Palladure 200 Palladium Concentrate (100 g/l Pd).

Palladure 200 Make-up Additive A

Palladure 200 Make-up Additive contains the active ingredients required on make-up for optimum range and brightness and to minimize deposit porosity.

Palladure 200 Replenisher A

Palladure 200 Replenisher is required to maintain optimum range and brightness during operation.

MAINTENANCE OF PALLADURE 200 REPLENISHER A CONCENTRATION

By Analysis

See the analytical procedure for the determination of Palladure 200 Replenisher A Concentration by UV/VIS Spectroscopy.

By Ampere-Minute Schedule

For every 100g of palladium deposited (3,300 ampere minutes), add 500 ml of Palladure 200 Replenisher A.

Palladure Conductivity Salts

Palladure Conductivity Salts are used to maintain the specific gravity within the recommended range. To raise the specific gravity by 0.01 (1.0° Baume), add 15 g/l Palladure Conductivity Salts.

Palladure Anode Depolarizer

Palladure Anode Depolarizer is used, as required, to minimize anode filming. Anode films are seen as an orange-brown deposit present on the anode surface. Add up to 10 ml/l Palladure 200 Anode Depolarizer in 2 ml/l increments, as necessary, to eliminate film.

Palladure 200 Acid Solution

Palladure 200 Acid Solution is required to lower solution pH. Since the pH of the Palladure 200 plating solution has a natural tendency to decrease with time, the acid solution is not required for regular maintenance. To raise pH, add ammonium hydroxide.

Ammonium Hydroxide

Ammonium hydroxide is used to raise solution pH. The quantity of ammonium hydroxide required is dependent upon operating temperature and solution pH.

EQUIPMENT

Tanks:	Koroseal-lined, PVDC, polypropylene or other suitable plastics; customers should check with Rohm and Haas Electronic Materials if the suitability of any material is in question
Anodes:	Platinized titanium, platinum-clad tantalum or platinum
Heater:	Immersion quartz or titanium heaters
Filter:	1 micron filters are recommended
Pump:	Sufficient capacity to turn bath over four times 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

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

e) Discard cleaning solution.

f) Recirculate water through the complete system.

g) Discard rinse water.

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

i) Discard neutralizing solution.

j) Recirculate water through the complete system.

k) Discard rinse water.

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

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

n) Recirculate leaching solution through the complete system.

o) Discard leaching solution.

p) Recirculate water through the complete system.

q) Discard rinse water.

PALLADURE 200 PURE PALLADIUM PROCESS

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

Palladure 200 Make-up Solution
Palladure 200 Palladium Conc.
Palladure 200 Make-up Additive A
Palladure 200 Replenisher A
Palladure Conductivity Salts
Palladure Anode Depolarizer
Palladure 200 Acid Solution

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 Rohm and Haas Electronic Materials Technical Representative for more information.chnical Representative for more information.

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