NISSIN

General Catalog

Precious Metal Plating Solutions

Metal Finishing Solutions

Insoluble Electrode

NISSIN KASEI CO.,LTD.

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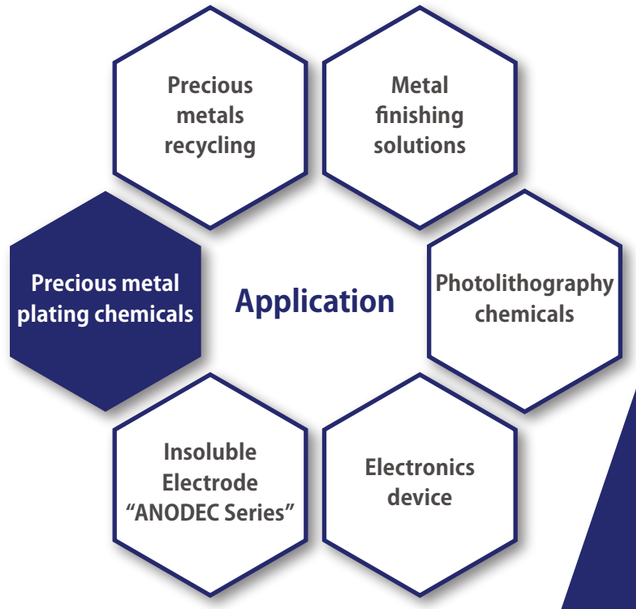
Precious Metal Plating Solutions, Metal Finishing Solutions, Related Products

Insoluble Electrode (ANODEC Series)

Nissin plating and finishing solutions – an integral part of Japanese industry

Nissin offers many chemicals and solutions indispensable to Japanese industries, such as our Aurobase Series gold plating solutions to our Nissinbright Series silver plating solutions. We've recently developed processes for gold, silver, and other metals that are cyanide free for environmental friendliness with the aim of contributing even further to industrial sectors. We've lately succeeded in developing an iridium plating solution, which has been said was impossible to do. Nissin continues to push the limits of possibilities.



Au

Gold Plating Solutions (Pure-Gold)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Aurobase 24K	Au:5～20	55～70	4.7～5.7	0.05～0.3	0.03～0.18	160	Au:99.9	Good gloss Large control range	○	○
Aurobase BG-10	Au:3～10	55	5.0	0.2～0.5	0.12～0.3	80	Au:99.99	Good bonding properties	○	○

Gold Plating Solutions (Gold Strike)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Auroseed EX	Au:1	25	5.0	1	0.06	-	Au:99.9	Highly stable For barrel plating	○	○
Auroseed ST	Au:1.5	40	0.1	5	0.06	-	Au:99+	For SUS and glossy Ni Good adhesiveness	○	○
Auroseed STP	Au:2	30	0.7	3	0.08	-	Au:99+	Sulfuric acid type Surface roughness suppression type	○	○

Gold Plating Solutions (Alloy)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Aurobase AC-4R	Au:4 Co:0.5	40	4.0	0.5	0.16	170	Au:99+ Co: <1	High hardness, high load capable Wear resistant, good shear strength	○	○
Aurobase M-150	Au:2～10 Co:0.6	60	3.8	5～100	0.2～15	160	Au:99+ Co: <1	High speed type For barrel and reel-to-reel plating	○	
Aurobase NW-FR	Au:8 Ni:1	35	4.0	1	0.2	170	Au:99.5 Ni:0.5	Good corrosion resistance For thick coating	○	○
ACTUS-5	Au:5 Ni:5	45	1.5	2	0.13	340	Au:95 Ni :5	High hardness Wear resistant	○	○
Aurobase IN-21	Au:6 Ni:2 In:1	60	3.5	1	0.2	220	Au:95 Ni:3 In:2	Hamilton Gold		○
Aurobase 3A-F	Au:2 Ag:0.9	60	9.7	0.2	—	—	Au:70 Ag:30	For thin gold-silver alloy films Lemon yellow		○
Aurobase ACG	Au:8 Ag:0.5 Cu:36	60	9.0	1	0.57	—	Au:70～75 Ag:6～10 Cu:15～24	100μm thickness OK Ternary alloy Pink gold		○
Aurobase 18K-PGB-4	Au:4 Cu:25	60	9.5	(1.2V)	0.25	—	Au:70～90 Cu:30～10	Stable 18K glossy film Voltage control Pink gold		○
Indebigold Pink	Au:0.7 Cu:2	50～60	8.0～9.0	(6V)	—	—	—	Thin coating, color enhancement Voltage control, pink gold color		○
Iron Gold SK-01N	Au:8 Fe:1.6	40	3.6	2	0.3	—	Au:98 Fe:2	Ni-free, for thick coating, light gold color		○
Iron Gold FW-SE	Au:3 Fe:8 In:2	30	2.3	1.8	0.05	—	Au:95.6 Fe:4.1 In:0.3	Ni-free, ternary alloy Hamilton gold		○

Gold Plating Solutions (Non-Cyanide Pure Gold)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Ecogold 24	Au:8	55	8.5	0.5	0.3	80	Au:99.99	Highly stable chemical Good bonding properties	○	○
Ecogold HO	Au:10	60	8.5	0.4	0.25	170	Au:99.9	Tl-free Hard gold	○	○
Ecogold HS	Au:15	60	8.5	1.5	0.93	160	Au:99.9	Hard metal, excellent heat resistance, high-speed type	○	
Ecogold ST	Au:2	40	8.5	1	—	—	Au:99.9	Strike plating	○	○

Gold Plating Solutions (Non-Cyanide Alloy)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Amber Gold AL-4	Au:4 Pd:0.5	50	10.3	0.5	0.1	—	Au:96 Pd:4	For Thin Coating, light amber color		○
APC-2E	Au:4 Pd:2 Cu:0.05	50	11	1.0	0.26	—	Au:90 Pd:9.5 Cu:0.5	For Thin Coating, champagne color		○

Gold Plating Solutions (Electroless Gold)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Chemigold TKN-4E	Au:4	80	4.5	substitution	0.04	80	Au:99.9	Au replenishable, for thick coating	○	

*Contact us for more information on metal concentrations and alloys not shown above.

Ag

Silver Plating Solutions (Pure-Silver)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Nissinbright N	Ag:30～60	15～35	12.0	0.5	0.31	200	Ag:99+	Sodium type Good gloss, high hardness	○	○
Nissinbright K	Ag:30～60	15～30	12.0	1	0.63	180	Ag:99+	Potassium type Good gloss	○	○
G-2	Ag:40	20	11.5	2	1.27	130	Ag:99.9	High speed type	○	○
G-4	Ag:40～80	20～30	12	5～30	3～18	140	Ag:99+	High Speed Type	○	
Sandy Silver	Ag:40～60	25～30	11.2	0.5～1	0.31～0.63	70	Ag:99.9	Satin finish film	○	○

Silver Plating Solutions (Non-Cyanide Pure Silver)

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Ecosilver SB106T	Ag:10	30	5.7	0.5	0.31	100	Ag:99+	Good discoloration resistance Ultra-thick applications OK	○	○
Ecosilver SB56T	Ag:40	40	6.0	0.5～4.0	0.31～2.52	100～150	Ag:99+	Good workability (Dk range) High speed type	○	
Ecosilver B36T	Ag:25	30	6.0	1.0	0.63	150	Ag:99+	Good glossiness	○	○
Ecosilver SBRCT	Ag:10	30	5.0	0.5	0.31	120～150	Ag:99+	Good heat resistance	○	
Ecosilver AP2	Ag:2	50	<1	1.0～5.0	—	—	Ag:99+	For nickel substrates Strike plating	○	○
Ecosilver RP18	Ag:2	40	6.0	—	—	—	Ag:99+	Anti-displacement chemical Immersion type	○	○

*Contact us for more information on metal concentrations and alloys not shown above.

Pd・Rh・Pt・Ru・Ir

Palladium Plating Solutions

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Pure Palladium T-10	Pd:10	20～35	12.5	0.5	0.13	400～450	Pd:99.9	For thin applications	○	○
Pure Palladium S-20	Pd:20	20～35	12.5	0.5	0.13	400～450	Pd:99.9	For thick applications	○	○
Pure Palladium PMB-10	Pd:10	60	8.5	2.5	0.65	160	Pd:99.9	Matte (needle crystal) Long life	○	
Pure Palladium PSB-500	Pd:5	60	7.5	1	0.26	200～250	Pd:99.9	Semi-glossy, low stress Barrel plating OK	○	
Pure Palladium PSB-ST	Pd:2	30	7.5	2	0.2	—	Pd:99.9	Strike plating	○	
Pure Palladium PAT-05	Pd:0.5	40	6.0	1	0.02	—	Pd:99.9	Ammonia-free For thin applications	○	
Palladium Nickel PNP-50	Pd:10 Ni:10	30	7.5	1	0.24	500～550	Pd:50～60 Ni:40～50	High hardness	○	○
Palladium Nickel PNP-80	Pd:20 Ni:10	30	8.8	1	0.26	500～550	Pd:80 Ni:20	For thin applications and up to 200 μm	○	○
Palladium Nickel PNP-HS	Pd:20 Ni:6～15	30～50	8.0	5～100	1.3～25	400～500	Pd:80 Ni:20	High speed type	○	○
Palladium Cobalt PCP-1	Pd:10 Co:1	57	3.2	1.5	0.27	500～600	Pd:85 Co:15	Heat treated to Hv700	○	
Palladium Cobalt PSB-CO	Pd:5 Co:0.8	40	9.0	1	0.25	500	Pd:95～85 Co:5～15	Heat treated to Hv700 10 μm non-cracking	○	○
Palladium Copper PUP-86	Pd:8 Cu:6	52	8.6	1	0.2	300～360	Pd:80～50 Cu:20～50	For underlayment Ni-free	○	○

Rhodium Plating Solutions

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Pure Rhodium F-1	Rh:2	45	≤0.1	5	0.17	650～800	Rh:99.9	Glossy white appearance For barrel plating	○	○
Pure Rhodium F-2	Rh:2	45	≤0.1	5	0.17	650～800	Rh:99.9	Glossy white appearance		○
Pure Rhodium TP-2	Rh:2	45	≤0.1	5	0.17	650～800	Rh:99.9	Base rhodium tone For barrel plating	○	
Pure Rhodium TP-5	Rh:5	50	≤0.1	2	0.17	650～1000	Rh:99.9	Thick applications OK	○	
Black Rhodium BL-50	Rh:1	50	≤0.1	2	0.01	—	—	Glossy black appearance		○

Platinum Plating Solutions

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Pure Platinum PTP-3E	Pt:3	80	9.5	1	0.1	500	Pt:99.9	Low concentration Stable current efficiency	○	
Pure Platinum PTP-6E	Pt:6	80	9.5	2	0.2	500	Pt:99.9	Can be directly plated to Cu & Ni Stable current efficiency	○	
Pure Platinum PTP-6	Pt:6	80	10.0	0.5	0.05	400	Pt:99.9	Thick applications of 5 μm OK Glossy appearance	○	○
Pure Platinum PTP-H	Pt:6	60	≤0.1	1	0.07	400	Pt:99.9	Acidic type Glossy appearance	○	○
Pure Platinum PTP-HU	Pt:5	60	≤1	0.5	0.03	500	Pt:99.9	Low temp 60° C, low concentration Flexible film	○	
Pure Platinum PTP-W	Pt:15	60	≤1	3	0.2	450	Pt:99.9	Low temp 60° C 20 μm ultra thick application OK	○	
Pure Platinum F	Pt:5	95	13	0.5	0.1	400	Pt:99.9	Alkaline type Glossy appearance	○	○
Platinum Ruthenium PTR-15	Pt:15 Ru:0.1	60	1 or less	3	0.2	500	Pt:92～99	High corrosion resistance Glossy appearance	○	○

Ruthenium Plating Solutions

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Pure Ruthenium Ru-2T	Ru:2	55	2.0	0.5	0.03	—	Ru:99.9	For thin applications For functional plating	○	○
Black Ruthenium RB-X	Ru:3	60	≤1	5	0.01	—	Ru:99.9	Glossy black appearance		○

Iridium Plating Solution

Name	Metal concentration (g/L)	Bath temperature (℃)	pH	Current density (A/dm²)	Deposition rate (μm/min)	Hardness (Hv)	Metal deposition (%)	Features	Industrial use	Ornamental
Pure Iridium IRP-10	Ir:10	87	5.0	0.5	0.09	700	Ir:99.9	High hardness High corrosion resistance		○

*Contact us for more information on metal concentrations and alloys not shown above.

Others

Pre/After Treatment Solutions

Name	Applications	Characteristics	Use	Processing time	Chemical temperature	Features
ALKALOL NT	Electrolytic degreasing	Liquid	10x dilution	30sec – 2min	50℃	Alkaline Prevents oil films on metal surfaces
SOLDIP #50	Immersion/ electrolytic degreasing	Liquid	20x dilution	30sec – 2min	Room temp to 50℃	Cyanide alkaline Easily prevents iron rust, smut, and oil
EL-8000A	Prevention of silver discoloration Gold sealing hole treatment	Liquid	20x Dilution	10sec – 1min	40℃	Excellent effect in preventing discoloration of various metals. Does not contain organic solvents or heavy metals. Does not affect contact resistance
EL-Ag	Prevention of silver discolation	Liquid	25x Dilution	5～30sec	30℃	Excellent effect in preventing silver discoloration Does not contain organic solvents or heavy metals, and does not affect contact resistanc

Metal Strippers

Name	Applications	Characteristics	Use	Processing time	Chemical temperature	Features
Auro Stripper L	Au stripper	Liquid	10x dilution	1μm/min	30℃	High speed stripper Does not harm Ni, SUS, or other substrates
Auro Stripper T	Au stripper	Liquid	10x dilution	1μm/min	30℃	No Pb RoHS compliant
Electrolytic Stripper TMK	Ni stripper	Liquid	5x dilution	1μm/min	Room temp	Non-poisonous/toxic applicable
Palladium Stripper 2	Pd stripper	Liquid	2x dilution	0.8–1μm/ min	30℃	Does not readily harm Ni, SUS, or other substrates
Palladium Stripper 3000	Pd stripper	Liquid	2x dilution	0.1μm/min	45℃	Suppresses better than Palladium Stripper 2
AG Stripper	Ag stripper	Liquid	10x dilution	—	30℃	High speed stripper Does not harm Ni, SUS, or other substrates

Etching Solutions

Name	Applications	Characteristics	Use	Processing time	Chemical temperature	Features
Gold Etching Solution RW-61	Au etching	Liquid	Uses undiluted solution	80nm/min	30℃	Good wettability, suitable for fine patterns Performance stability through suppression of liquid composition changes
Gold Etching Solution RW-62	Au etching	Liquid	Uses undiluted solution	250nm/min	30℃	Good wettability, suitable for fine patterns Performance stability through suppression of liquid composition changes
Chrome Etching Solution TW	Cr stripper	Liquid	Uses undiluted solution	—	40～50℃	Does not impair the glossiness of photosensitive films or gold films, allows for sharp pattern shapes
Chrome Etching Solution TW #4	Cr stripper	Liquid	Uses undiluted solution	—	40～50℃	Suppresses side etching
Chrome Etching Solution TW #5	Cr stripper	Liquid	Uses undiluted solution	—	40～50℃	Suppresses side etching better
Acid Rinse Solution for Chrome Etching	Cr stripper	Liquid	Uses undiluted solution	—	Ambient temp	Effectively removes etching residue

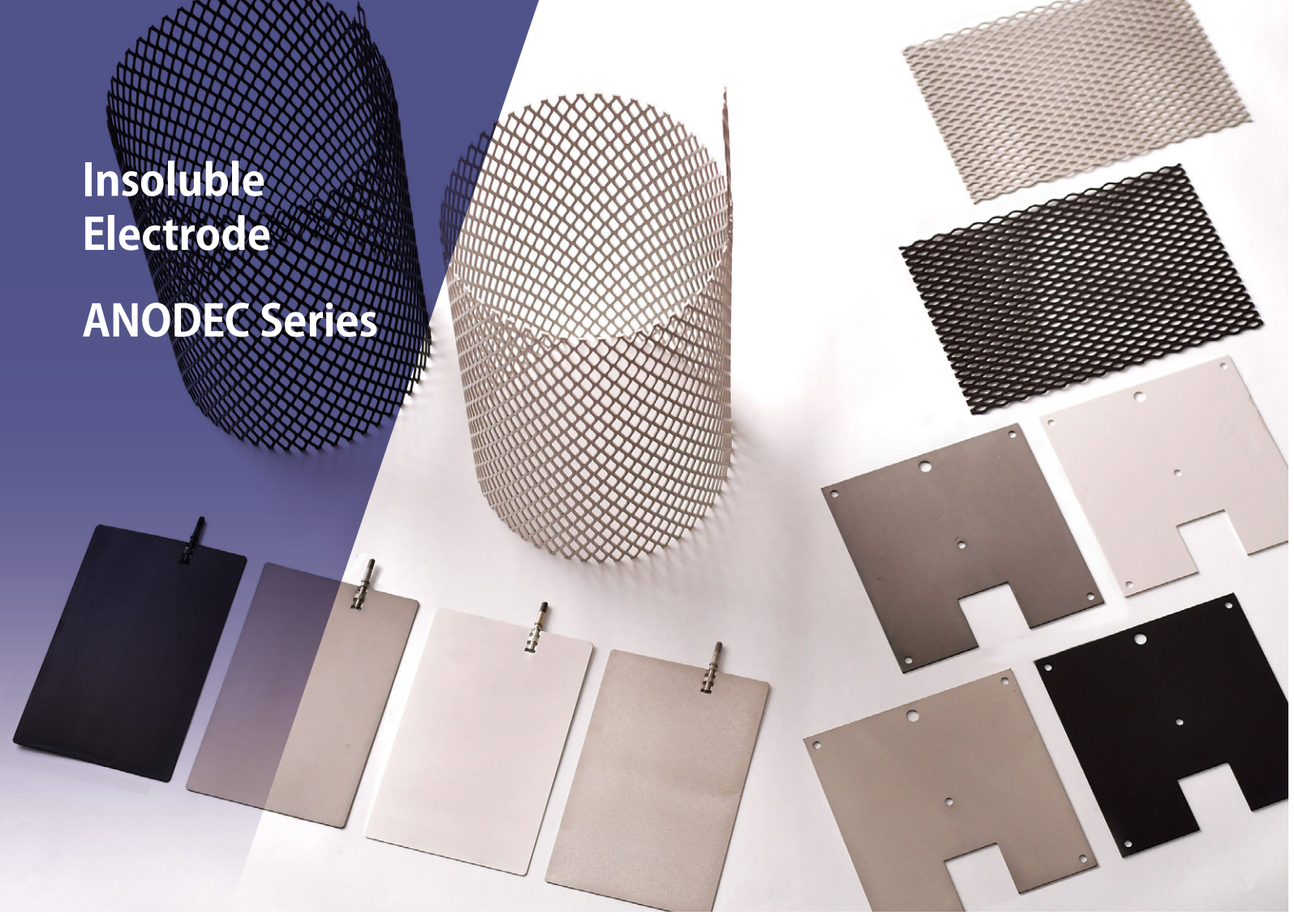
Silver Paste

Name	Features
AG Paste TB	Room temperature curing type

Precious Metals Recycling Systems

Name	Type	Size	Throughput	Recyclable metals	Metal concentration
ECR-5	Absorbing coal	φ400x1000	Max. 500 L/hr	Au,Ag,Pt,Pd,Rh	10 ppm – 0.1 ppm
Gold Erector	Electrolysis	300Wx300Lx520H	Electrolytic bath volume 19 L	Au,Ag,Pt,Pd,Rh	1g/L – 10ppm

*Contact us for more information on metal concentrations and alloys not shown above.

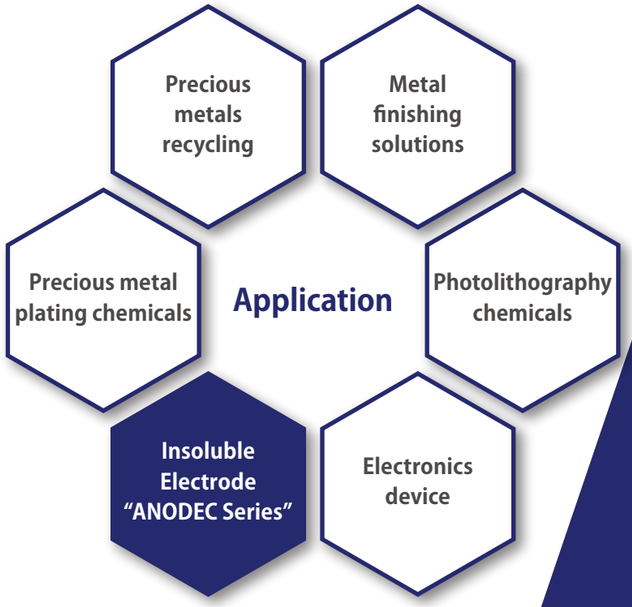


Insoluble Electrode

ANODEC Series

“ANODEC” – named for its ultra-high quality anode

The name “ANODEC” comes from its insoluble anode, which provides long-lasting stable performance.
Nissin’s ANODEC insoluble anodes are formed by bonding platinum, iridium, ruthenium, or other platinum group metals (or oxide films) to the surface of a metallic titanium substrate. This gives them high electrochemical catalytic performance with excellent durability.



ANODEC Series Features

ANODEC Features

1 Corrosion resistance
Corrosion resistance for long electrode life

2 Compact
Can be used at high current densities, allowing for more compact equipment

3 Anode-cathode distance
There is little anode wear deformation, giving it a constantly stable anode-cathode distance

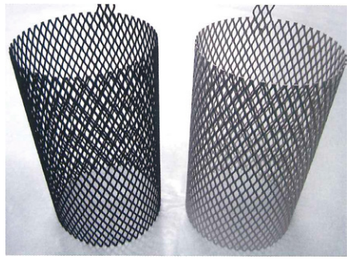
4 Easy to maintain
Prevents smut from forming – no electrode maintenance needed

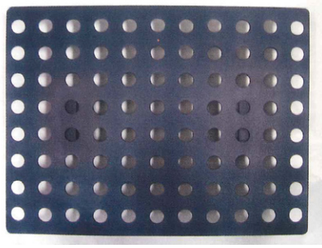
5 Lightweight
Allows for lightweight electrodes (60% lighter than lead electrodes)

6 Flexible shape designs
Allows for the manufacture of complex electrode shapes

7 Recoating
Used electrodes can be recoated (can reuse titanium substrates)

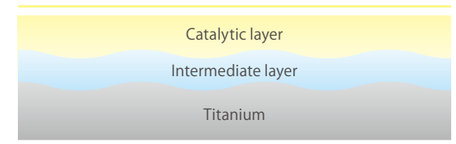

ANODEC 100


ANODEC 100 ANODEC 400

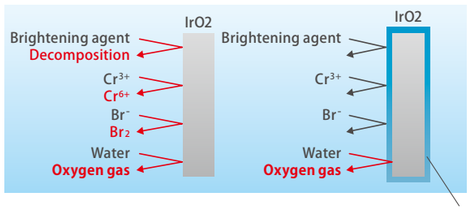

ANODEC 100

ANODEC Technology

The ANODEC Series are highly durable products used in many processes in the electrical plating field, such as copper plating for printed circuit boards, electrolytic copper foil production, chrome plating, nickel plating, and so on. We have an extensive track record of providing our customers with the optimal electrode specifications for their operating conditions.



Provides an optimal special intermediate layer on the metal – catalytic layer interface.



New ANODEC 100 Series

ANODEC 100RE
The ANODEC 100RE provides a special highly corrosion resistant intermediate layer, developed exclusively by Nissin, for applications using low loads. This gives the electrode an exceptionally longer life.

ANODEC 100CA
The ANODEC 100CA provides a special coating layer, developed exclusively by Nissin for selective reactivity, for use in applications where the electrolytic oxidative decomposition of organic additive components in plating solutions is severe to provide drastically reduced consumption of brightening agents.

In addition to the above, we also proactively promote the development of optimal electrodes for our customer’s operating conditions.

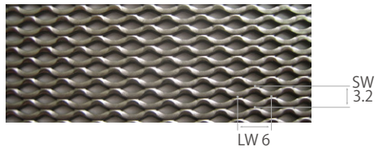
ANODEC Series Features

Available Sizes

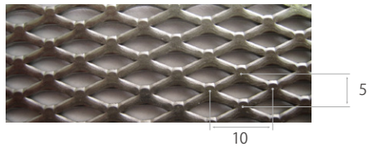
Product name		Max. dimensions	Shape
ANODEC 100	RE	t10 x W1400 x 1800	Sheet metal,round bars,mesh (shapes combining these available)
	-01		
	-02		
	-03		
	CA		
	FX		
ANODEC 200	GD		
	-01		
	-02		
	Platinum baked		
ANODEC 300			
ANODEC 400		t10 x W2000 x L1000	

Standard Mesh Sizes (mm)

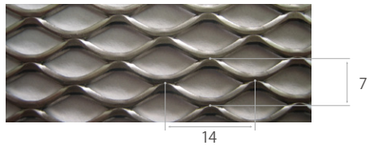
t1.0 x 3.2 x 6.0



t1.0 x 5.0 x 10.0



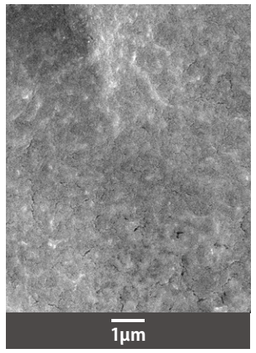
t1.0 x 7.0 x 14.0



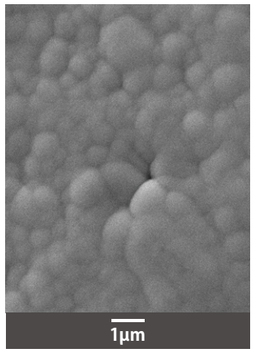
t: mesh thickness, SW: mesh short way hole pitch, LW: mesh long way hole pitch

Related Material

ANODEC 100 surface appearance

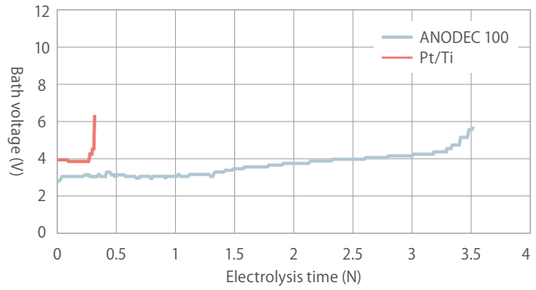


ANODEC 400 surface appearance



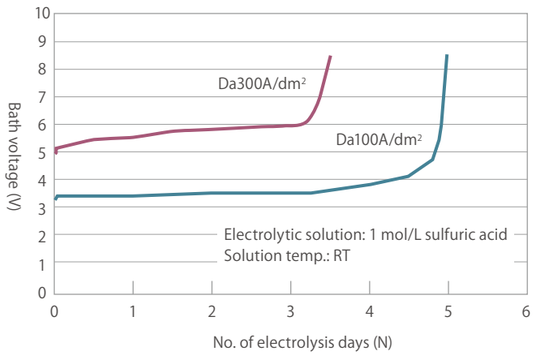
Sample ANODEC durability test

Comparison of the durability of ANODEC 100 and Pt plated electrode in sulfuric acid

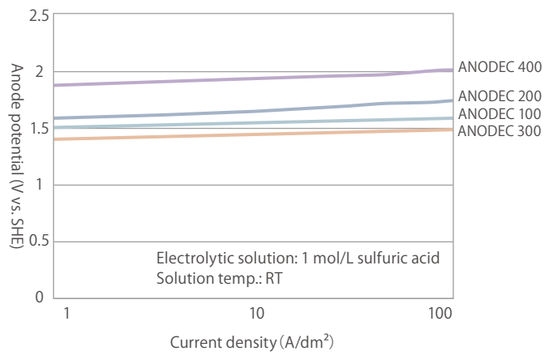


<Test conditions> Electrolytic solution: Sulfuric acid 100 g/L
Anodic current density: 100 A/dm²

ANODEC 100 relationship between current density and electrode life



ANODEC Series anode potential



ANODEC Series Features

List of Properties

Baked electrode

Product name		Type	Cladding material	Std. cladding weight	Main applications	Features
ANODEC 100	RE	For oxygen generation	Iridium oxide	10 g/m² (5–10g/m²)	Low load plating in acidic solution	Perfect for low load applications (<10 A/dm²)
	-01			20g/m² (15–50g/m²)	Overall plating in strongly acidic solution Copper foil mfg., chemical conversion coating	Low oxygen generating potential High current density response, long-term stability
	-02				Aluminum electrolytic capacitor	Perfect for solutions containing organic acids
	-03				Copper foil mfg	Low oxygen generating potential Perfect for copper foil mfg. and post-processing
	CA			20g/m² (15–30g/m²)	Printed circuit board (copper sulfate) Suppresses oxidative decomposition of organic matter, etc.	Strong selective reactivity Suppresses brightening agent and metal ion valence changes
	FX			10g/m² (5～15g/m²)	Printed circuit board (copper sulfate) Strongly acidic, corrosive liquid	Longer service life than conventional products Ideal for low to medium load applications
ANODEC 200	GD	For chlorine generation	Platinum/ Iridium oxide	10g/m² (5～20g/m²)	Various types of electrolyzed water (hypochlorous acid, etc.)	Long-term stability of hypochlorous acid generation efficiency Compatible with reverse electrolysis
	-01			20g/m² (5–30g/m²)	Various types of electrolyzed water (hypochlorous acid, etc.) Seawater electrolysis	High hypochlorous acid generating efficiency
	-02				Various types of electrolyzed water (ionized water, etc.)	Controls hypochlorous acid generating volume Perfect for ionized water production
	Platinum baked		Platinum	10g/m² (5–20g/m²)	Various types of electrolyzed water (ionized water, etc.) Various types of plating	Controls hypochlorous acid generating volume Appropriate for ionized water production
ANODEC 300		For chlorine generation	Ruthenium oxide	20g/m² (5–30g/m²)	Soda electrolysis	Low chlorine generating potential Weak anode oxidizability

Electroplated electrode

Product name	Type	Cladding material	Std. cladding weight	Main applications	Features
ANODEC 400	For standard electrodes	Platinum plating	2μm (0.3–10μm)	Precious metal plating, standard plating For ionized water and cathodes	Appropriate for industrial plating and ionized water production Can be used as auxiliary anodes and cathodes

List of Applications

Application	Name	ANODEC 100						ANODEC 200				ANODEC 300	ANODEC 400
		RE	-01	-02	-03	CA	FX	GD	-01	-02	Platinum baked		
	Cladding material	Iridium oxide						Platinum/ iridium oxide			Platinum	Ruthenium oxide	Platinum plating
Industrial electrolytic plating	Copper foil (foil mfg.)		○		◎		○						
	Copper foil (auxiliary electrode)		◎		○		◎						
	Copper foil (post-processing)		○		◎		○						
	Printed circuit board substrate copper plating (sulfate bath)	○	○			◎	◎						
	Zinc plating (sulfate bath)	◎	○										
	Nickel plating (Watt/sulfamic bath)	○	◎	○		○							○
	Chrome plating (trivalent)				○	◎							
	Chrome plating (hexavalent)		◎										◎
	Precious metal plating	◎	○		○			○	○	○	○		◎
	Gold plating for connectors		◎										○
Chemical conversion coating	Aluminum electrolytic capacitor		○	◎									
	Electrolytic pickling		◎				○						
Electrowinning	Alkaline cyanide electrolysis	○	◎										
Various types of electrolyzed water	Ionized water							○	○	◎	◎		◎
	Disinfects, sterilizes							◎	◎	◎	○		○
	Hypochlorous acid							◎	◎	○	○	○	
Salt water electrolysis	Seawater electrolysis							○	◎	○		○	○
	Soda (sodium chloride) electrolysis							○	○	○		◎	
For cathodes	For cathodes							○		○			◎

*Examples of standard applications/specifications

We offer the optimal standard for your application, purpose, and operation conditions. Contact us for more information.

Insoluble Electrode (ANODEC Series)

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