

PLATCORE

LIGHT COLOR Ru/Pt ALLOY ELECTRODEPOSITION PROCESS

DESCRIPTION

PLATCORE is an innovative plating process which permits a shiny deposit of a 65% Ruthenium and 35% Platinum alloy with color close to that of Palladium. Thanks to its proper aesthetic and chemical – physic characteristics, the Ruthenium – Platinum alloy achieved through **PLATCORE** is an excellent alternative to Palladium or micron Palladium alloys as intermediate barrier layer against *tarnishing* or oxidative process which is common in both the Fashion accessories and Custom Jewelry sectors, and caused by copper migration from bulk to the external layers.

PLATCORE is a process easy to manage giving shiny and mirror like deposits for flash.

- Cheap process
- Flash process
- Precious mirror like deposit
- “L” color coordinate (luminosity) closer to that of Pd.
- Resistant to both abrasive and climatic tests
- Totally Nickel and Ammonia free
- Easy to be stripped out.

DEPOSIT DATA

Thickness (um)	0 – 0.2
Appearance	Bright
Color	Characteristic light (white – light grey)

PRODUCT FORM

Form	Concentrated make-up 25L = 50 ready to use liters
Material color	Transparent solution
Storage time	2 years
Volume	25 liters is the standard packaging for make-up



PRODUCT USAGE	RANGE	OPTIMAL
Voltage (V)	1 - 8	1.8 (indicative, depending on the desired alloy composition)
Current density (A/dm²)	0.5 - 10	2
Working temperature (°C)	55 - 65	60
Exposure time (sec)	0.25 µm in 4 min at 1 A/dm ²	
Cathode efficiency (mg/Aminute)	5 - 7 mg/Aminute	6 mg/Aminute
pH	0.5 - 1	0.7
Solution density (°Bè)	10 - 12	11
Anode/cathode ratio	1:1-4:1	2:1
Anode type	Ti/Pt	Ti/Pt
Agitation	Vigorous solution agitation and cathodic bar movement	

METAL CONCENTRATION

METAL	RANGE (g/l)	OPTIMAL (g/l)
Ruthenium (Ru)	4.0 – 10.0	5.0
Platinum (Pt)	0.5 – 1.0	0.7

COLOR COORDINATES

L	82
a	0.5
b	3.2
c	3.2

Note: Color coordinates here reported have been measured on a white underlayer and they are to be intended as **PURELY INDICATIVE** being strongly dependent on underlayer color, on thickness of the deposit and on specific design (shape) of the surface.

LIST OF THE PRODUCTS FOR PLATCORE PROCESS
PRODUCTS NECESSARY FOR INSTALLATION

PLATCORE-B*	Make-up PLATCORE (50UN=25L), concentration 50%
PLATCORE-B10*	Make-up PLATCORE (10UN=5L), concentration 50%
PLATCORE-R2*	Concentrated solution of Ruthenium 20 g/l (Replenisher 2)
PLATCORE-R3*	Concentrated solution of Platinum 10 g/l (Replenisher 3)
PLATCORE-WA	Wetting agent for PLATCORE, 1 L

*Substances which are subjected to the international regulations concerning transportation of dangerous goods

PRODUCTS FOR BATH MAINTAINING AND RECOVERY

PLATCORE-R1*	Replenisher 1, 250 ml bottle
PLATCORE-R2*	Concentrated solution of Ruthenium 20 g/l (Replenisher 2)
PLATCORE-R3*	Concentrated solution of Platinum 10 g/l (Replenisher 3)
PLATCORE-R4	Brightener replenisher solution containing indium, 250 ml bottle
PLATCORE-R3S*	Concentrated solution of Platinum 2 g/100 ml (Replenisher 3 Small, alternatively to PLATCORE-R3)
PLATCORE-WA	Wetting agent for PLATCORE, 1 L
RU5S*	Conducting salts and pH correction, 1 kg
PT4SC	Conducting salts, 1 kg

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SOLUTION PREPARATION

Before starting **PLATCORE** solution preparation, make sure the working tank is perfectly cleaned. If not, the working tank should be cleaned with solution containing 2% of trisodium phosphate and 2% of KOH. The solution should be kept at 50 °C for two hours. Then, drain the tank and rinse with abundant deionized water.

Condition it again, at the very end, with a solution 2- 3% in sulfuric acid and in movement granted by the magnetic driven pump for about 1 day.

At this point it will be finally possible to set the ready to use plating solution by following step-by-step this procedure:

1. Fill at the beginning with deionized (D.I.) water the working tank with **no more than 1/10 of the total volume** to be set (i.e.: do not add more than 1 liter of D.I. per every 10 liters of final ready-to-use plating solution to prepare).
2. Add then in the working tank the required make-up **PLATCORE-B** or **PLATCORE-B10** quantity. The quantity required for make-up must be calculated in an order of half volume than the total liters of ready-to-use plating solution it has to be set since it comes in a solution two times concentrated (i.e.: consider 5 liters of make-up solution per every 10 liters of final ready-to-use solution).

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3. Slowly add then the necessary amount of Ruthenium replenisher solution **PLATCORE-R2** (i.e.: add PLATCORE-R2 in quantity of 250 ml per every liter of plating solution to set up to reach the suggested 5 g/l of Ru final concentration).
4. Once PLATCORE-R2 has been completely dissolved in the forming solution add (always slowly) the necessary amount of Platinum replenisher solution **PLATCORE-R3** in the quantity of 70 ml per every liter of plating solution to set up to reach the suggested 0.7 g/l of Pt final concentration).
5. Then, once even PLATCORE-R3 has been completely dissolved and homogeneous in the forming solution, add further D.I. water and 1 – 2 ml/l of wetting agent **PLATCORE-WA** until reach the final desired ready-to-use volume. Put the plating solution so prepared under movement by magnetic driven pump connected to the working tank.
6. Heat it to the optimum working temperature and finally start to work.

BATH MAINTENANCE

For the maintenance of the working solution over time, the following additions could be considered as a guideline after every 4000 Amin:

- 1 replenisher unit **PLATCORE-R1** (250 ml bottle);
- 1 liter of **PLATCORE-R2** equal to 20 g of fine Ruthenium;
- 0,5 liters of **PLATCORE-R3** equal to 5 g of Platinum (alternatively 250 ml of **PLATCORE-R3S**).
- 1 replenisher unit **PLATCORE-R4** (250 ml bottle).

Note: Attention! **These values here reported, although reliable, are purely indicative.** They could be deviate from guideline depending on plant features, on specific articles to be treated, drag-out phenomena, on the working methodology adopted. For these reasons, it is advisable to do frequent chemical analysis of the ready to use plating solution and to dose replenishers and additives only after analysis reported by our lab and technical service.

REQUIRED EQUIPMENT AND SUPPLIES

ANODES

It is strongly suggested the use of Titanium Platinum (Ti/Pt) anodes. High temperatures and solution acidity, in facts, can during time deteriorate MMO anodes with consequent poor conductivity and solution contamination.

MATERIALS FOR THE WORKING TANK

PP/ PVC/ HDPE for larger volume tanks supplied together with a good quality exhaust fume/suction system or Pyrex glass (for small volume amount solutions in beaker scale).

MOVEMENT AND FILTRATION

Solution needs to be under movement and stirred by a suitable magnetic driven filter pump. When in movement, the solution needs also to be filtered by using 5 microns (max 10 microns) PP wrapped wire filter cartridges which stayed previously immersed in deionized water heated at 60°C for a couple of hours and then washed with abundant deionized cold water before their usage.

Filter pump must have a flow rate 5 times/hour more than solution volume to have a proper solution filtration and movement during the electrolytic process.

Even objects to be covered with PLATCORE must be moved through a moving cathodic bar while plating.

The contemporary movement of the solution and of the rack let to obtain homogenous and bright finishes as this combination removes in the most efficient possible way the gaseous hydrogen bubbles developed closer to the items surfaces during plating time.

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WATER PURITY

To prevent any bath contamination during the ready to use solution preparation or during any other subsequent maintenance operation, it is advisable to use deionized water with a conductivity less than 3 $\mu\text{S/cm}$ (and free from any traces of organic compounds, silicon, boron).

RECTIFIER

Use a current DC rectifier having an alternate current residue –ripple-less than 5% and having an output amperage sufficient to obtain a proper electroplating process. The rectifier should be equipped with:

- Ammeter
- Voltmeter
- Ampere/minutes counter

To plate on silver 925 or on pure silver (plated silver layer) **a pulsed rectifier would be advisable**. In fact it permits cling better on such materials the Ru/Pt generated alloy more than other advantages like:

- Possibility of having more compact and thick deposits;
- Higher rate of deposition;
- Less hydrogen development with less tensioned Ru/Pt deposited layer.

In general the usage of a pulsed rectifier gets better results for PLATCORE than standard for every type of substrates to be plated.

HEATING SYSTEM

The admitted materials for heaters are: Pyrex, quartz or PTFE.

SUPPLEMENTARY INFORMATION

PULSED RECTIFIER

In case of pulsed rectifier usage we suggest to set the following parameters:

- *Initial Voltage* 2.0 V
- *Pulse intensity* + 30% than initial Voltage
- *Ton (pulse duration)* 50 ms
- *Toff (no pulse duration)* 50 ms

The composition for a Ru/Pt alloy deposited with pulsed rectifier is more shifted to a 60% Ru – 40% Pt than 65%-35%.

PLATCORE ON SILVER

Being strongly acidic PLATCORE is chemically aggressive for a silver substrate (Ag 925 or Ag 1000). To improve the deposition of PLATCORE on those type of substrates **with a treatment time below than 2 minutes** we recommend the usage of pulsed rectifier (see higher) and enter with the plating rack inside the plating solution under current (with the rectifier already switched on). This last fact will not give time to the strong acidic chemical system to attack the silver underneath material thus limiting the possibility to have dark spots.

ATTENTION! After PLATCORE deposition it is possible that even PLATCORE vapors attack the treated silver surface once the plating rack is removed from the working solution. A wash in ultrasonic solution or in alkaline hot water can eliminate this type of problem.

PLATCORE WETTING AGENT

Its addition will increase items wettability thus reducing the hydrogen gaseous development close to the surfaces to be worked.

STRIPPING OF PLATCORE

The Ru/Pt deposited alloy is strippable for example by immersion in a solution of 30 g/l of KCN.

REFINING

For the exhaust solutions it is possible the easy recover for the precious metals contained.

ABOUT THE pH

Normally the pH for the ready to use solution must not exceed 1. In case it is possible to lower it by adding RU5S conducting salts in the necessary quantity to arrive at the right pH values.

ABOUT THE TEMPERATURE

Working at lower temperature than 60°C can reduce the formation of spots on silver based underneath materials however it reduces both cathodic efficiency and throwing power so that it is finally not suggested especially if chains are worked with.

ABOUT THE DENSITY

If necessary the density has to be raised by the addition of conducting salts. To higher of 1 Be' the density add 7,5-10 g of RU5S + 7,5-10 g of PT4SC conducting salts per every liter of ready to use plating solution.

ABOUT INORGANIC CONTAMINATION

Being strongly acidic the plating solution behaves like a pure ruthenium solution. That means it is extremely sensitive to the presence of Ag, Cu, Zn Ni already at low ppm concentration. As consequence, if such materials need to be plated with PLATCORE it is **strongly advisable to start immediately the DC power – electric rectifier once the items have been introduced or enter unde current (with the rectifier already switched on, see perevious paragraph)** inside the plating solution without leaving time to the solution to corrode them leaving in the solution such metals which can accumulates during time.

SAFETY INFORMATION

Classification and designation are noted in the Material Safety Data Sheets for each process product component (according to the European legislation). The safety instructions and the instructions for the environmental protection must be followed in order to avoid hazards for people and environment. Please consider the explicit details in our Material Safety Data Sheets.

DISCLAIMER

All recommendations and suggestions in this bulletin concerning the use of our products are based upon tests and data believed to be reliable. Since the actual use by others is beyond our control, no guarantee expressed or implied, is made by Legor Group, its subsidiaries or distributors, as to the effects of such use or results to be obtained, nor is any information to be construed as a recommendation to infringe any patent.