

PTLUX

ELECTROLYTIC PROCESS FOR Pt/Ru WHITE ALLOY DEPOSITION

DESCRIPTION

PTLUX is an electrolytic system which permits to obtain shiny deposit of a platinum–ruthenium alloy with a major composition in platinum. Thanks to its aesthetic and chemical-physical characteristics, the platinum–ruthenium alloy obtained with the **PTLUX** process is an alternative to a palladium deposition (or to palladium alloys) as flash mid protection layer as well as a final layer for white finishing.

- Thickness up to 1 micron without cracks
- Wide operative range
- For both roto-barrel and rack electrodeposition

DEPOSIT DATA

Thickness (um)	0 – 0.2 (at 2 g/l Pt + 1g/l Ru)
Density (g/cm³)	Approximately 20, as it is dependent by final composition of the electrodeposited alloy
Appearance	Shiny
Color	White



PRODUCT FORM

Form	Concentrated Make-up
Material color	Transparent solution for the make-up (base)
Storage time	2 years for the make-up
Volume	5 liters for the make-up in standard packing for the preparation of 25 liters ready to use

PRODUCT USAGE

	RANGE	OPTIMAL
Voltage (V)	1.5 – 3.0	1.8
Current density (A/dm²)	0.5 – 3	2
Working temperature (°C)	30 – 60	35
Exposure time (sec)	45 – 300	90
Cathode efficiency (mg/Amin)	4 – 6	5
Anode/cathode ratio	1:1 – 4:1	2:1
Anode type	Platinized titanium	Platinized titanium
Agitation	Moderate	Moderate

METAL CONCENTRATION

METAL	RANGE (g/l)	OPTIMAL (g/l)
Platinum (Pt)	1.5 – 2.5	2
Ruthenium (Ru)	0.5 – 1.5	1

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COLOR COORDINATES

L	87.0
a	0.6
b	3.0
c	3.1

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 PTLUX PROCESS

PRODUCTS NECESSARY FOR INSTALLATION

PTLUX-B.25U	PTLUX make-up (5L = 25U which correspond to 25 liters ready to use plating solution)
PTLUX-PTR.1L*	Platinum replenisher for PTLUX 15 g Pt/l
PTLUX-RUR.250ML*	Ruthenium replenisher for PTLUX 5 g Ru/250ml
	Sulfuric acid p.a. 96 – 98%, d = 1.84 g/ml (Provided by the Customer)

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

PRODUCTS FOR BATH MAINTAINING AND RECOVERY

PTLUX-R.250ML	Replenisher for PTLUX - 250 ml
PTLUX-PTR.1L*	Platinum replenisher for PTLUX 15 g Pt/l
PTLUX-RUR.250ML*	Ruthenium replenisher for PTLUX 5 g Ru/250ml
PTLUX-BR.1L	Brightener for PTLUX – 1L
PTSC.1KG	Conductive salts for platinum plating solutions – 1KG

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SOLUTION PREPARATION

Before starting **PTLUX** 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 the working tank with deionized water for just about **half the final volume** of ready to use bath to be prepared (i.e.: add 13 liters of DI water for every 25 liters of ready to use final solution to prepare);
2. Slowly in order to avoid overheating phenomena add sulfuric acid in quantity of 60 ml per every liter of ready to use plating solution to prepare (i.e.: 1,5 liters per 25 final liters of ready-to-use-plating solution).
3. Add then in the working tank the make-up **PTLUX-B** in the required amount considering that it is 5 liters for 25 liters of ready-to-use solution to prepare. (200 ml per every liter of ready-to-use solution to prepare);
4. Add then the required replenisher solution of platinum **PTLUX-PTR** in quantity enough to make a concentration of 2 g/l of Pt (i.e.: 133ml of PTLUX-PTR for every liter of ready to use solution to be installed, so 3.33 liters for 25 liters of ready to use solution);

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5. Stir to homogenize the solution. At this point slowly add the necessary quantitative of ruthenium enough to make a concentration of 1 g/l under replenisher solution **PTLUX-RUR** (i.e.: 50ml of PTLUX-RUR for every liter of final volume to prepare, so 1.25 liters, or 5 full packs, for 25 liters of ready to use bath). Its important to add slowly the ruthenium to not generate overheat;
6. Once added the concentrated solution of ruthenium as well, proceed to add the left quantity of DI water to reach the final volume;
7. Heat the solution to the optimum working temperature and finally start to work.

*Alternatively, it is possible to buy directly the ready for use plating solution **PTLUX-RTU.1L**. In this last case it will be enough to pour directly this solution into the working tank, heat it eventually to its optimum working temperature and start to plate.*

BATH MAINTENANCE

For the maintenance of the working solution over time, the following additions could be considered as a guideline after every 600 A/min:

- 50 ml of **PTLUX-R**, replenisher solution.
- 200 ml of **PTLUX-PTR** (equals to 3 grams of fine Pt).
- 15 ml of **PTLUX-RUR** (equals to 0.3 grams of fine Ru).

The brightener solution **PTLUX-BR.1L** can be used for specific interventions when, for example, after excessive drag or filtration with active carbon, it is necessary to restore the brightening initial level which has decreased its effect. In the case of its use, it is recommended to proceed by adding 5 ml at a time for every liter of ready to use solution. Check the state of the deposit after every single addition. In any case it would **not** be recommended to make more than 4 total adds (equal to 20 ml/l in total) to avoid an excessive saturation of organic compounds in the solution.

Attention! The values higher reported in the guideline, although reliable, are purely indicative. They could be deviate from guideline depending on plant features, on specific articles to be treated, 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 after analysis reported by our lab and technical service only.

REQUIRED EQUIPMENT AND SUPPLIES

ANODES

For an optimal conduction of the process, it is strongly suggested the use of Titanium platinized anodes with a platinum coverage thickness not lower than 1.5 µm.

MATERIALS FOR THE WORKING TANK

High density PP / PVC / PE tanks for higher volumes and equipped with an efficient fumes aspiration system or Pyrex glass (for small volume amount solutions in beaker scale).

A fumes aspiration system for the tank is necessary! (Fogs coming out of the acid bath and dragged from the development of hydrogen gas. Possible allergic and irritating effect if breathed).

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), previously immersed in hot demineralized water at approximately 60°C for a couple of hours, then washed thoroughly with cold demineralized water before their use.

The filtration pump must have a capacity of approximately 5 times/hour the volume of the liquid to grant the necessary filtration and agitation of the bath during the electrolysis.

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It will not be necessary to use a moving cathodic bar while plating. If the movement is in any case present it would be in the range with a rate of 2 – 8 cm/s. The movement of the solution let to obtain homogenous and bright finishes as it removes in the most efficient possible way the gaseous hydrogen bubbles developed closer to the items surfaces during plating time.

RECTIFIER

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

- Ampmeter
- Voltmeter
- Ampere/minutes counter

HEATING SYSTEM

The admitted materials for heaters are Pyrex, quartz or PTFE, with a device for the regulation and the control of the temperature (thermostat).

SUPPLEMENTARY INFORMATION

PTLUX is a process which works with a nominal concentration of 2 g/l of Pt and 1 g/l of Ru for flash applications mainly.

PROCESS WATER PURITY

To prevent any contamination of the bath in the preparation phase as well as in any other following operation for its maintenance, use demineralized water with a conductivity lower than 3 μ S/cm (and without any trace of organic composites, chlorine, silicon and boron).

ATTENTION! THIS ASPECT IS OF EXTREME IMPORTANCE FOR THE CORRECT USAGE OF THE PLATING SOLUTION **PTLUX** AS THIS SYSTEM RESULTS HIGHLY SENSIBLE TO CONTAMINANTS, ESPECIALLY THOSE OF ORGANIC TYPE AND CYANIDES.

In case of plating solution contamination call our Technical Service to get the right corrective guidance.

PRE-TREATMENT

PTLUX can be directly deposited on gold, silver, palladium and palladium alloys. For all the other metals it is necessary to make an intermediate deposit (strike) of precious metal in order to avoid any possible contamination of the **PTLUX** plating solution by metallic contaminants like: copper and zinc. All base metals that can suffer passivation over time must be reactivated before the application of **PTLUX**.

As pre-treatment it is suggested to execute a preliminary degreasing cycle for ultrasounds to be followed by a washing in water. Subsequently, electrolytically degrease using the alkaline degreasing solution from the **NEATECH** line or the **SGR1P.25KG**. Once the items has been washed again in demineralized water, proceed to their neutralization by repeated immersion (3 – 4 times in a row) in the slightly acidic solution prepared with the activator salts **SATT.25KG** or, alternatively, with **NEUT-SA.1KG** at room temperature, in order to be sure that no any alkaline residue (coming from various degreasing cycles) can enter by dragging in the **PTLUX** solution with contamination risk (which would lead to a reduction of it life). After the neutralization, wash in demineralized flowing water and immerse the pieces in the **PTLUX** bath.

POST-TRATEMENT

Proceed to remove any trace of the electrolyte from the treated surface as quick as possible. Therefore, remove the residue of platinum–ruthenium solution through a phase of static demineralized water immersion (recovery) to be followed by a current demineralized water wash. Proceed then with drying. Before final drying it can be useful to make another immersion in hot static demineralized water to make the platinum/ruthenium deposit shinier.

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SOLUTION DENSITY

To increase the throwing power of the bath or its viscosity, there are **PTSC** conductive salts at disposal which, in case, can be progressively added at 10 g/l at a time until the reaching of the desired conditions.

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.