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ELECTRODEPOSITION OF PALLADIUM

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This invention relates to the electrolytic deposition of palladium in the form of a bright adherent deposit and to the preparation of suitable baths for this purpose.

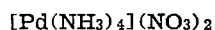
We have found that satisfactory bright coatings of palladium are obtained in high current yields from baths comprising solutions of palladium ammonia compounds, i. e. tetramminepalladium salts, which have been rendered slightly alkaline or slightly acid. Suitable salts for the preparation of these baths are obtained by treating solutions of palladous chloride, sulphate, nitrate or phosphate with ammonia, boiling until the precipitate first formed redissolves and evaporating the solution until the desired salt separates as crystals. The baths are then made up by dissolving in warm water a quantity of the salt sufficient to produce a solution which contains from 1 to 2.5 per cent of palladium metal. The addition of a conducting salt such as, for example, sodium sulphate, nitrate or phosphate is advisable in order to improve the throwing power.

We may operate these baths in a neutral condition, but inasmuch as free ammonia is produced during the electroplating, we prefer to add a small quantity of ammonia to the freshly prepared bath in order to obtain uniform conditions throughout its use. Alternatively we may add from time to time sufficient acid to keep the bath in a slightly acid condition throughout its period of use. The palladium salt used and the acid added must be so chosen that no precipitate is formed on mixing, as for example, would be the case if palladosammine chloride and hydrochloric acid were used.

We have obtained the best result with tetramminepalladium sulphate or nitrate to a solution of which is added about 1 per cent of free ammonia, or 0.5 to 1 per cent of sulphuric, nitric, or, preferably, phosphoric acid.

The following is an example of a plating bath made according to this invention, but the invention is not restricted thereto.

30 grame of tetramminepalladium nitrate



are dissolved in one litre of warm water and to this solution 50 grams of sodium sulphate or sodium nitrate are added, together with 10 grams of phosphoric acid or 10 cubic centimetres of strong ammonia solution. This bath is operated at a temperature above 40° centigrade, preferably at from 65° to 80° centigrade. It has a good throwing power with relatively high current efficiency and produces bright smooth adherent de-

posits of palladium. The brightness of the deposit may be improved by the addition of a small quantity of a colloid, as for example 0.01 per cent of dextrin, glue or a vegetable gum, whereby the grain size of the deposit is refined.

The current density required may vary from 3 to 25 amperes per square foot at a pressure of 1.5 volts or higher, but should be so adjusted that there is no evolution of hydrogen at the cathode.

The bath may be regenerated by the addition of a further quantity of the plating salt when the palladium content of the bath has fallen below 0.5 per cent. Acid or alkali may be added from time to time as required to maintain the composition of the bath fairly uniform.

It has already been proposed, for the purpose of depositing palladium, to dissolve palladium chloride in ammonia, to add a reducing agent, to heat, cool and add another reducing agent, and to use the resultant mixture as a plating bath; according to this invention, however, reducing agents are neither necessary nor beneficial and are therefore not used.

Tetramminepalladium compounds, the acid group of which is reducible under the plating conditions, such as the nitrite compounds, give low current yields and the use of these compounds is therefore not advantageous.

What we claim is:—

1. A process for the electrodeposition of palladium in the form of a bright adherent plate in which the electrolyte comprises a solution containing a tetramminepalladium salt the acid radicle of which is not reduced under the plating conditions and preferably a conducting salt and a small quantity of an alkali.

2. A process for the electrodeposition of palladium in the form of a bright adherent plate in which the electrolyte comprises a solution containing a tetramminepalladium salt the acid radicle of which is not reduced under the plating conditions and preferably a conducting salt and a small quantity of an alkali with a small quantity of a colloid for refining the grain size and improving the brightness of the deposit.

3. A process for the electrodeposition of palladium in the form of a bright adherent plate in which the electrolyte comprises a solution containing a tetramminepalladium salt the acid radicle of which is not reduced under the plating conditions and preferably a conducting salt and a small quantity of an acid.

4. A process for the electrodeposition of palladium in the form of a bright adherent plate in which the electrolyte comprises a solution containing a tetramminepalladium salt the acid radi-

	cle of which is not reduced under the plating conditions and preferably a conducting salt and a small quantity of an acid with a small quantity of a colloid for refining the grain size and improving the brightness of the deposit.	
5	5. In the process as claimed in claim 1 employing one of the group comprising tetramminepalladium sulphate, tetramminepalladium nitrate, tetramminepalladium phosphate and tetram-	
10	minepalladium chloride as the plating salt.	
15	6. In the process as claimed in claim 2 employing one of the group comprising tetramminepalladium sulphate, tetramminepalladium nitrate, tetramminepalladium phosphate and tetram-	
	minepalladium chloride as the plating salt.	
20	7. In the process as claimed in claim 3 employing one of the group comprising tetramminepalladium sulphate, tetramminepalladium nitrate, tetramminepalladium phosphate and tetrammine-	
	palladium chloride as the plating salt.	
	8. In the process as claimed in claim 4 employing one of the group comprising tetrammine-	
	palladium sulphate, tetramminepalladium nitrate, tetramminepalladium phosphate and tetramminepalladium chloride as the plating salt.	
	9. In the process as claimed in claim 1 adding a small quantity of ammonia to the plating bath.	80
	10. In the process as claimed in claim 2 adding a small quantity of ammonia to the plating bath.	
	11. In the process as claimed in claim 3 adding a small quantity of an acid selected from the group comprising sulphuric, nitric and phosphoric acids.	85
	12. In the process as claimed in claim 4 adding a small quantity of an acid selected from the group comprising sulphuric, nitric and phosphoric acids.	90
	13. A plating bath comprising a solution of tetramminepalladium nitrate, about 5% of sodium nitrate and about 1% of phosphoric acid.	95
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