APPROVED FOR PUBLIC RELEASE

LAMS--1065

Copy 4 Of 27

Series..A

LOS ALAMOS NATIONAL LABORATORY
3 9338 00424 5071

APPROVED FOR PUBLIC RELEASE

[redacted]

UNCLASSIFIED

Classification Cancelled ~~or Changed~~
TO
By Authority of Declass. Office - L.A. 2/15/50
K. Russell Secy & NCO 2/17/50
Name Title Date

PUBLICLY RELEASABLE
LANL Classification Group
B. Kolatin
11/8/95

LAMS-1065

Series A

[redacted]

[redacted]

This document contains 3 pages

ELECTROPLATING OF BERYLLIUM

VERIFIED UNCLASSIFIED
B. Kolatin
11/8/95

by

M. Kolodney

Chemistry - General

[redacted]

UNCLASSIFIED

LOS ALAMOS NATL. LAB. LIBS.
3 9338 00424 5071

APPROVED FOR PUBLIC RELEASE

APPROVED FOR PUBLIC RELEASE

[redacted] UNCLASSIFIED

ELECTROPLATING OF BERYLLIUM

by

M. Kolodney

SURFACE PREPARATION

When plating directly upon clean machined beryllium is attempted, the adhesion of the deposit is invariably poor. It therefore becomes necessary to pretreat the beryllium to promote adherence. Dilute sulfuric acid had previously been employed for this purpose, but was found inadequate. After a number of tests, an anodic etch in aqueous phosphoric acid containing a small amount of HCl, followed by a short chemical etch in sulfuric acid was decided upon. The following steps were used.

1. Clean cathodically in 50 g/ℓ KOH at room temperature, 0.5 amp/sq. in. for 3 minutes, using stainless steel anodes. This treatment removes grease and dislodges loose particles.

2. Wash in cold water.

3. Etch as anode in equal volumes of 85% H_3PO_4 and water containing 10 cc/ℓ concentrated HCl. Operate at room temperature, with nickel cathodes, for 5 to 10 minutes at 0.5 amp/sq.in. Extruded beryllium may be etched for the shorter time, while cast material, in general, requires longer etching.

4. Wash in water.

5. Immerse for 1 minute in a solution containing 100 g/ℓ ammonium sulfate and 50 cc/ℓ concentrated sulfuric acid.

6. Wash in water.

7. Plate.

When the weight of beryllium is required prior to electrodeposition, step 6 is followed by acetone rinsing and drying. The specimen should be washed again before plating.

The adhesion after the described treatment appears to be excellent, both by mechanical tests and microscopic examination.

UNCLASSIFIED [redacted]

APPROVED FOR PUBLIC RELEASE

APPROVED FOR PUBLIC RELEASE

[redacted] UNCLASSIFIED

The plating solutions used and the corresponding operating conditions are summarized below.

Silver Plating

140 g/ℓ AgCN; 204 g/ℓ KCN; 15 g/ℓ K_2CO_3. Room temperature, 0.1 amp/sq.in.

Silver Strike

4.5 g/ℓ AgCN; 70 g/ℓ NaCN. Room temperature, 0.2 amp/sq.in., 4 to 12 minutes.

Gold Plating, Low Current Density

4.75 g/ℓ AuCN; 15 g/ℓ KCN; 4 g/ℓ $Na_2HPO_4 \cdot 12\ H_2O$. Operate at 60 to 80°C, 0.02 amp/sq.in.

Gold Plating, High Current Density

15 g/ℓ AuCN; 32 g/ℓ KCN; 4 g/ℓ $Na_2HPO_4 \cdot 12\ H_2O$. Operate at 60 to 80°C; 0.04 amp/sq.in.

Cadmium Plating

45 g/ℓ CdO; 120 g/ℓ NaCN; 0.4 g/ℓ $NiCO_3$; 12 g/ℓ Goulac. Allow to stand for 2 to 3 days. Decant and filter. Room temperature, 0.2 amp/sq.in.

Indium Plating

Dilute prepared $InCl_3$ solution containing 18 g In as metal, to 100 ml. Add 30 g dextrose. Add this solution with rapid stirring to one containing 160 g KCN and 40 g KOH in 350 ml of water. Dilute to one liter. Room temperature, 0.15 amp/sq.in. (Alternatively the $InCl_3$ solution may be prepared by dissolving 18 g of metal in 80 ml of concentrated HCl, evaporating to dryness, and taking up in 100 ml of water.)

Tin Plating

120 g/ℓ $Na_2SnO_3 \cdot 3H_2O$; 7.5 g/ℓ NaOH; 15 g/ℓ $NaC_2H_3O_2$; 0.5 g/ℓ H_2O_2. Operate at 60 to 90°C, 0.15 amp/sq.in.

It was found that a silver strike of approximately 10 minutes duration was of considerable aid in securing complete coverage prior to the application of the major portion of the deposit.

UNCLASSIFIED [redacted]

APPROVED FOR PUBLIC RELEASE

APPROVED FOR PUBLIC RELEASE

[redacted]

DOCUMENT ROOM

REC. FROM Eng-1

DATE 1-27-50

REC. ✓ NO. REC.

[redacted]

APPROVED FOR PUBLIC RELEASE