

APPLICATION NOTE

Prototype Plating Using the Indium Sulfamate Plating Bath Kit

Introduction

The indium sulfamate plating bath kit is useful for plating indium onto small prototype parts prior to scale up.

Electroplating indium onto various materials allows the evaluation of indium's unique properties. For example, two metallic substrates can be electroplated with indium and subsequently bonded together simply by pressing the indium-plated surfaces together. This process utilizes the cold welding property of indium. Plating can be performed on any properly prepared substrate metallization such as copper, brass, nickel, gold, tin, or mild steel. As with all electrodeposited metals, indium will not deposit onto high refractory metals, such as chromium or tungsten. Stainless steel and aluminum metallizations must have special surface treatments prior to electroplating with any metal. Specific information on these surface treatments can be found in most electroplating textbooks.

Some Unique Properties of Indium Metal

- Extreme softness and ductility, even at cryogenic temperatures
- Ability to cold weld to itself
- Low-melting temperature of 157°C and high boiling point of 2,080°C
- Low vapor pressure
- Ability to deform under mild pressures to form a reliable gasket between the mating surfaces of two parts; indium fills and bonds to the surface micro-porosity of the two mating parts
- Ability to form a diffusion bond with certain metals such as gold
- Ability to wet glass and certain other non-metallics

Kit Contents

- One 1-liter bottle of ready-to-use indium sulfamate plating bath
- Two 1" wide x 0.0625" thick x 12" long pure indium anode strips
- *A Guide to Indium Plating*

Other Items Required

- A laboratory direct current (DC) rectifier
- A small glass or plastic container to be used as the plating tank
- Plating pretreatment chemicals
- Laboratory stirrer

Kit Set-Up

1. Prepare a clean laboratory beaker (or a small rectangular, square, or cylindrical container of glass or plastic) for use as the plating tank.
2. Insert the indium anode strip vertically into the plating tank until it reaches about one inch from the bottom, press the strip

against the side of the tank, and bend the strip over the top lip of the tank.

3. Determine the surface area of the part to be plated.
4. Trim the immersed portion of the indium anode strip so that its surface area is greater than, or equal to, the surface area of the part being plated.
5. Ensure that the non-immersed section of the anode provides sufficient area for the rectifier anode clip to be attached to the strip.
6. For parts that need both front and back surfaces plated, insert a second indium anode strip on the opposite side of the tank (one anode on each side of the part to be plated). Fill the tank with the plating solution and connect the anode wire (red) from the rectifier to the anode strips. Immerse a laboratory stirrer into the bath and adjust the agitation to ensure that the anode strips do not move away from the side of the tank.

Plating Procedure

1. Measure the area of the part(s) to be plated and calculate the current required for proper current density. More information can be found in *A Guide to Indium Plating*.
2. Part(s) should be alkaline-cleaned, rinsed, acid-activated, and rinsed prior to indium plating. Details on these pretreatment procedures can be found in most electroplating textbooks.
3. Connect the cathode wire (black) from the rectifier to the part(s) and immerse in the indium plating solution.
4. Set the amp meter on the rectifier to the calculated amperage and electroplate to the desired thickness. Refer to *A Guide to Indium Plating* for time necessary at a given current density to achieve a desired thickness.
5. After plating, rinse parts thoroughly and dry.

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Contact our engineers today: askus@indium.com

Learn more: www.indium.com

ASIA +65 6268 8678 • CHINA +86 (0) 512 628 34900 • EUROPE +44 (0) 1908 580400 • USA +1 315 853 4900

Form No. 98063 R1 



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