Rhodium is a rare earth metal which is a silver-white color, chemically inert, hard transition metal. It is a member of the platinum group, along with iridium, osmium, palladium, platinum, and ruthenium. Rhodium is extremely durable with a Vickers Hardness of 1246 MPa. It is resistant to corrosion, oxidation, tarnishing, and scratches, with a boiling point of 3727°C and a melting point of 1966°C. Although it is more costly than most other precious metals, its benefits typically are more valuable than the added cost when considering its qualities. The major benefits of rhodium include heat resistance, mechanical wear and chemical protection, electrical conductivity, and friction reduction. Industrial rhodium is particularly precious since it is typically acquired as a by-product of refining other metals, such as copper and nickel. In nature it is found with other platinum group minerals and metals. These characteristics combined with its low electrical resistance makes rhodium commonly used as an electrical contact material for electrical contacts, semiconductor wafers, printed circuit boards (PCBs), and other mission critical components.

The Challenge

Rhodium electroplating is more challenging to electroplate when compared to other precious metals. Additionally, costs are much higher during the plating bath operation, especially if the plating is not done currently. Due to rhodium’s inertness, once plated it cannot be chemically removed for in-process re-work, whereas most other precious metals can be chemically stripped in cases where re-work is required. In the electroplating industry rhodium has a high barrier to entry due to initial costs, with a high cost of failure. The result is a steep learning curve when developing the proper electroplating techniques. Companies looking to electroplate rhodium onto high value parts need to consider the high risk of failure, therefore finding a company experienced in rhodium electroplating is essential. For this reason, there is a shortage of rhodium platers with experience and adequate capabilities to serve the market demand for challenging electroplating projects, making it difficult for manufacturers to work on rhodium plating requirements without a trusted, capable partner.

The Engineered Solution

Semiconductor electroplating typically has precise requirements such as flatness of base material wafers or precise diameters of the interconnected pins for hermetically sealed connectors, with equally tight plating tolerances for the plating thickness and uniformity deposited to the flat wafers or precise diameter electrical connector pins. Often, these wafer assemblies have miniature features such as numerous small wires and stacked chips compacted onto a small wafer diameter which requires only selective areas of the assembly plated. Other applications include contact pins, which are assembled in a hermetically sealed connector build that requires selective plating at the ends of the pins and specifies a very uniform plating deposit due to post plating hermetic sealing assembly requirements. Thus, process control is critical for plating and especially critical for rhodium plating to achieve reliable and repeatable outcomes. The plating bath and the parts being processed must be in its purest form free of dust and particles, and the bath must be frequently maintained and monitored. For this reason ProPlate employs an in-house chemistry department so that chemistries can be proactively managed whereas many electroplating companies do not have in-house chemical testing and management capabilities; which forces these plating operations to wait for weeks or months to receive bath test data that is critical to quality outcomes. ProPlate has offered customers rhodium plating services since inception in 1983, giving it a vast knowledge base of experiences to offer its customers for unique plating projects and production services.