

Non-Cyanide Electrolytes for Gold Plating – A Review

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Nowadays, the cyanide and ferrous cyanide solutions are used in practice for gold plating. The traditional baths employed for soft gold as well as hard gold plating contain the cyanide complex, $[\text{Au}(\text{CN})_2]^-$, as the source of gold, which release free cyanide ions during the plating. Those compounds are very toxic, and formation and maintenance of cyanide baths is expensive and risky for technical personnel; also, they attack photoresists used to delineate circuit patterns and bonding pads. Due to this reason, and especially in modern time, there is a trend of using the electrolytes without content of cyanides. These electrolytes are mainly based on some organic compounds. This article is an overview of the non-cyanide electrolytes for gold plating introduced into practice or only tested in the laboratory. The large number of investigated complexes fulfils the coating quality requests, but there are problems related to their stability. Decorative gold plating obtained from classic cyanide electrolyte and an electrolyte based on mercaptotriazole have shown similar characteristics such as microhardness, surface roughness, visual appearance and adhesion. At the same time, this bath remained stable in a period of at least nine months.

Keywords: Electroplating, Gold baths, Stability constants, Complexing ligands, Photoresists, Soft gold

1. INTRODUCTION

The history of gold deposition began in the early nineteenth century when many art objects were electroplated with gold. It has been traced to the early work of Brugnatelli in 1805 [1]. Gold electroplating formulations based on the double salt gold potassium cyanide was patented in 1840. Since then, many types of gold formulations have been produced to meet the market requirements. Due to the changing trends in fashion, the application of certain colours or shades of the electroplated gold can only last for about forty years [2, 3]. The electronics industry began its development in the 1940's and 1950's; during this period, platters faced new demands for deposits with different properties,

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