RESIDUAL STRESSES IN BRUSH-PLATED GOLD COATING

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Electroplated gold coatings have attracted much attention because of their desirable properties such as resistance to oxidation, low electrical resistance, overall chemical inertness and low processing temperature. One of the methods of electrodeposition is brush-plating (selective plating, contact plating, swab plating), which is known as a slow method applied primarily in cases where the areas to be coated are small and somewhat unique [1]. In general, this method only requires a power pack, and a number of different solutions and brush tools to perform the brush-plating process.

To determine residual stresses in brush-plated coatings, a conventional deformation method was used where an unclosed ring strip serves as the substrate [2].This kind of substrate makes possible the automatic deposition of the coating. The substrate is fixed to a mandrel, which makes free slipping of the edges as well as momentless deformation of the coated substrate possible. The slit increment of the substrate is measured as successive layers of the coating are deposited and the ring is free from the mandrel. The calculation formula is extended Stoney's formula which takes into consideration the real shape of the substrate, and the difference between the elasticity moduli and the coefficient of thermal expansion of the coating and the substrate materials.

In this study residual stresses were determined depending on current density in gold coating deposited from a commercial SIFCO Dalic Solution (Gold (Hard Alloy), Code SPS 5370) on brass substrate. The sensitivity of the method is studied and the uncertainties of computed mean values of the residual stresses are presented.

Residual stresses in coatings represent significant tensile stresses and their maximum values are higher than the values of stresses in coatings obtained in a bath solution.

Keywords: brush-plating, ring strip substrate, coating, slit increment, residual stress

References

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