

Effect of Electroless Plating Conditions on Ni-Sn-P Coatings' Properties

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Abstract

In this study, the electroless Ni-Sn-P coatings with different compositions were deposited on the copper substrate. To investigate the effect of plating condition on Ni-Sn-P coatings' properties, time (20-40 minute) and temperature of electroless plating (80-88°C) were changed. Surface composition and surface morphology of coatings were studied by Energy Dispersive Spectroscopy (EDS) and Field Emission Scanning Electron Microscope (FESEM) respectively. Corrosion behavior of coatings was studied by electrochemical tests in 10 wt % acid sulfuric. Results showed that changes in time and temperature of electroless plating led to changes in Ni, Sn, P contents, deposition rate, and surface morphology of coatings. Coatings that obtained at higher times and temperatures of electroless plating showed a nodular structure with bigger nodule size. Results of corrosion behavior tests in 10 wt % acid sulfuric showed that coating with higher tin content had the best corrosion behavior.

Keywords: Electroless, Ni-Sn-P, Corrosion behavior, Plating condition.

1 Introduction

The Electroless method for deposition has advantages such as the ability to coat interior surfaces and ability to be applied to various substrates such as metals, plastics, glass and ceramics [1, 2]. Although a variety of metals can be electrolessly deposited, electroless Ni-P coatings have received particular attention because they have excellent corrosion resistance, good mechanical and electric properties. These properties result in wide application range in various industries including oil and gas, electronic, chemical, automotive, aerospace, and mining [1, 3-4]. A mixed electrochemical process takes place in the deposition of electroless coatings; in this process reducing agent oxidized and provides free electrons for metal deposition [5]. There are numerous parameters affecting the electroless nickel process. The quality of electroless coatings is dependent upon the microstructure

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