Short Communication

Effect of Pretreatment Process on the Adhesion and Corrosion Resistance of Chromium-Carbon Coatings Deposited on Copper Substrates

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In this work, the copper substrates are pretreated by chemical polishing and mechanical polishing to change their surface roughness. Then, the effects of the substrate surface roughness on adhesion and corrosion resistance of chromium-carbon coatings electrodeposited onto copper substrates are investigated. The surface roughness of chromium-carbon coatings are analyzed by a surface roughness measuring system. An ELCOMETER-106 adhesion tester is utilized to measure the adhesion strength of chromium-carbon thin films electrodeposited on copper substrates. The highest adhesion strength of 8.1 MPa is obtained for chromium-carbon thin film electrodeposited on mechanically polished copper substrate. The electrochemical behavior tested by potentiodynamic for two scans in 3.5 wt.% NaCl solution shows that the chromium-carbon thin film electrodeposited on mechanically polished copper substrate exhibits better corrosion resistance than that of chromium-carbon coating electrodeposited on unpolished and chemically polished substrates. The chromium-carbon thin film electrodeposited on mechanically polished copper substrate with the least roughness has the relatively highest corrosion resistance and adhesion force and this can be attributed to the chromium-carbon thin film has a crack-free structure when the copper substrate is polished mechanically.

Keywords: chromium-carbon thin films, adhesion strength, mechanical polishing, chemical polishing

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