

CORROSION PROPERTIES OF ELECTRODEPOSITED MULTILAYER COATING BASED ON Cu-Zn/MWCNT COMPOSITE

Stepanova D.L., Maizelis A.O.

*National Technical University
«Kharkiv Polytechnic Institute», Kharkiv*

Brass plating is primarily used for rubberising steel components to prevent corrosion and as a decorative coating [1]. Over the past decade, copper-zinc alloy coatings have attracted increasing attention due to their potential applications as memory materials and as electrode materials. The incorporation of carbon materials can improve alloying properties, such as corrosion resistance, which extends the service life. Multilayer coatings are a promising type of composite coating matrix consisting of periodically alternating thin layers of metals or alloys [2, 3]. In this report, electrodeposition parameters for formation of multilayer composite coating with increased hydrophobicity and corrosion properties are considered.

The aim of the research was to evaluate the feasibility of incorporating multiwalled carbon nanotubes (MWCNTs) into multilayer coatings based on copper-zinc alloys. For this purpose, the kinetic regularities of electrode processes of copper-zinc alloy deposition from a pyrophosphate-citrate electrolyte in the presence of MWCNT and surfactant stabilizers were investigated, the conditions for the formation of composite multilayer coatings based on this alloy on carbon steel samples, the corrosion properties of multilayer and composite multilayer coatings, and the wettability of the coating surface with water were studied.

The effect of multilayer carbon nanotubes was investigated by analyzing the cyclic voltammetric curves and chronopotentiograms of alloy film deposition. To study the electrode process, the CV method with a change in the potential scanning boundary and a delay at this value was used. It was found that under the conditions of the two-pulse galvanostatic method of multilayer coatings formation, the presence of MWCNTs in the electrolyte leads to an increase in the deposition potential of multilayer coatings layers at the same value of the current density. At the potentiostatic mode the values of the deposition current density of the composite coating layers are twice as high as those for the original multilayer coatings after 10 minutes. The hydrophobicity of the coating was evaluated by the angle of its wetting with a drop of water. Increase in copper content in the coating leads to higher polarization resistance and two times lower corrosion rate. The advantages of composite coatings with multilayer carbon nanotubes over the original multilayer coatings based on copper-zinc alloys have been revealed.

References:

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