K.I. Satpayev Kazakh National Research Technical University
A. Burkitbaev Institute of Metallurgy and Industrial Construction
Department of Engineering Physics

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Topic: Development of optimal processing modes for aluminum alloys with a protective coating of electrolytic-plasma oxidation

Master: Baktybayeva K.A., supervisor: prof. Smagulov D.U.

Key words: interfacial polymerization, thermogravimetry, electron microscopy.

The object of study is a heat-resistant aluminum alloy of the Al-Cu-Mn-Zr system with an alloying component content of not more than 5 weight %.

The purpose of the work: obtaining adsorbents based on nanostructured polyaniline, studying the structure and properties of the polymer obtained by the method of interfacial and "reverse" interfacial polymerization, further recommending these adsorbents as materials with improved quality for hydrogen storage.

The aim of the work is the calculation and experimental construction of phase diagrams of a multicomponent system based on aluminum, development of a new laboratory installation for electrolytic-plasma oxidation for electrolytic-plasma oxidation of metals and alloys based on them and the development of a highly efficient, low energy-consuming and environmentally friendly technology for electrolytic-plasma oxidation of electrolytic-plasma oxidation to increase the strength and resistance to friction of the surface layer of low-alloy steels and aluminum alloys used for the manufacture of critical parts of oil installations.

The relevance of research is due to the fact that at present the method of exposing the surface of a particle with highly concentrated energy is widely used. Among them, the most environmentally friendly, efficient, energy-saving method of electrolytic-plasma oxidation. As a result of the action of the ion electric discharge of elements formed in high-temperature plasma during electrolytic-plasma oxidation, profound changes occur in the phase composition and structure of a thin surface layer. As a result, the stability and hardness of the parts to friction increase.

Research results: the analysis of the phase composition of the alloys was carried out, the optimal contents of alloying elements were determined. The concentration and temperature ranges were determined at which the maximum amount of $Al_20Cu_2Mn_3$, Al_3Zr, Al_6Mn dispersoids and the minimum amount of the Al_2Cu phase, which corresponds to the best heat resistance of the alloys, can be achieved. Studies have shown that electrolytic-plasma oxidation in certain modes leads to an increase in the strength properties of aluminum alloys. It was found that the structural-phase transformations that strengthen the aluminum alloy during electrolytic-plasma oxidation takes place at significantly lower energy costs compared to traditional heat treatment.