ELECTROLYTIC NICKEL ALLOYS – STATUS AND PROSPECTS

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Currently, binary and multicomponent nickel alloys have found application in almost all branches of industry, utilities, medical industry and everyday life. This state of their application is due to a number of circumstances, in particular, they are used as a structure-forming matrix, an alloying component in the creation of synergistic compositions to improve functional properties, etc.

But recently, the use of nickel alloys has been limited in some areas of activity in order to prevent direct long-term human contact with products on the surface of which there is a coating of nickel or its alloys. The reason for this phenomenon is quite banal - it turned out that nickel alloys are a sufficiently allergenic material, which led to restrictions on their use in many countries even at the legislative level. However, this fact does not limit the use of nickel alloys in other areas of production, on the contrary, multicomponent alloys on a nickel base with refractory metals have become widespread. Such as molybdenum, tungsten, zirconium, vanadium, etc. And there were several reasons for this.

Firstly, such alloys are characterized by a high, and sometimes unique, level of functional properties - physicochemical, physicomechanical, electrophysical, etc., due to the implementation of synergistic effects of various natures.

Secondly, in the conditions of coprecipitation of nickel with the above metals, oxometalates are mainly used as their alloy-forming compounds, a characteristic feature of cathodic processes involving which is a staged reduction with the formation of oxide compounds of an intermediate oxidation state.

Under such conditions of the course of cathodic reactions, there is a high probability of the formation of metal-oxide composites, where nickel plays the role of the metal structure-forming matrix, and oxide compounds of refractory metals are incorporated into the composition of the composite electrolytic coating (CEC). This is precisely why the stability and efficiency of electrolytes significantly increases, since for the production of CEPs it is not necessary to introduce separate phases into the solutions, create conditions for their stabilization, use various anti-gravity devices, etc. It is precisely these methodological principles that formed the basis for our creation of a new generation of CEPs [1], as a product that is in great demand in industry.

Reference:

1. Yar-Mukhamedova G.Sh., Sakhnenko N.D., Ved M.V. Nanocomposite electrolytic coatings with defined functional properties. – Almaty: Kazakh University, 2020. – 180 p.