ABSTRACT

Master's dissertation: 108 pages, 15 tables, 23 figures, 82 references.

ALLOY 2024, INTERMETALLIDE, MASS TRANSFER, MECHANICAL ALLOYING, QUASI-HYDROSTATIC PRESSURE, ULTRASONIC IMPACT TREATMENT (UIT).

The object of research: physical and chemical processes which cause a modification of the surface layers of the alloy 2024 after ultrasonic impact treatment with a drummer with Armco iron and steel AISI 52100.

The purpose of research: a comparative analysis of the peculiarities of the chemical and phase composition of the near-surface layers of the aluminum alloy 2024, the degree of their strengthening and the intensity of the processes of mass transfer of Fe to Al due to UIT under different stress conditions.

Research methods: micro durometer, X-ray diffraction and electron microprobe analysis, scanning electron microscopy.

Results and novelty: the cyclical nature of changes microhardness of the surface layers of the alloy 2024 depending on the amplitude and duration UIT in air and inert environment is determined. Under the conditions of UIT in air, the maximum values of microhardness are achieved in the case of the use of a striker from steel AISI 52100. In an inert medium, the higher values of the microhardness of the alloy 2024 were obtained at UIT using the armco-Fe striker.

It is proved that the growth microhardness value on surface alloy 2024 by ultrasonic impact treatment is caused by a decrease in the size of CSR, an increase of microdeformations, formation of Fe-Al intermetallic phases.

Practical importance: the results and the established physical laws are of practical interest for laying the foundations of strengthening of surface layers of light structural alloys for targeted control of their performance and to incorporate new technologies in reinforcing engineering metal surfaces.

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