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Electroimpulse treatment of Al – 4%Cu alloys

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Abstract

Alloys of Al – 4 % wt. Cu with a small amount of iron and silicon impurities (up to three tenths of a percent) by means of the thermal treatment of the respective melts using a unipolar electric impulse action with an oscillation frequency of 1000 Hz, a single signal duration of 10^{-9} s and a signal strength of 1 MW that corresponds to a generator power of 1 W were gotten. The reference samples without such treatment were gotten too. The microstructure and microstructure of unipolar electroimpuls irradiated and nonirradiated samples of alloys were studied using chemical analysis and micro-X-ray spectral analysis; the hardness of the samples of these alloys was determined as a function of the time of the electric pulse treatment of their melts. Experiments were carried out on the electric pulse irradiation of melts of this composition during their crystallization, including in crucibles of various forms, namely in the form of boats and cups. The effect of the difference in the shape of the crucibles on the hardness and structure of the resulting alloys was estimated. A comparison is made with the results of other studies, where a significant amount of impurities is present in the Al-Cu system alloys. Conclusions are drawn about the relationship between the change in the hardness of alloys, both with a change in the duration of unipolar electric pulse treatment of their melts, and with a change in the amount of impurities in them due to this very treatment of their melts. The reasons for such changes are also discussed. The results of chemical analysis, micro-X-ray spectral analysis, hardness measurements are summarized in three tables and are represented by four figures of micro and macrostructure of the samples of the studied alloys.

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