

Nanoobjects microscopy

Effect of small additives of alloying elements on aging in cast Al-Cu-based alloys

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High-strength casting aluminum alloys are of great interest for modern engineering. Al-Cu alloys are widely used in domestic and international aircraft building.

The primary task of this study is to choose an effective alloying system for providing improved mechanical and technological properties of model cast Al-Cu alloys (Al-4.6%Cu-0.4%Mn-0.2%Ti), using magnetohydrodynamic (MHD) melt mixing. Small additives of alloying elements that modify both grain structure (Mn, Zr) and reinforcing phases (Sn) were used [1-4]. The structure of alloys was studied using structure methods (metallography, TEM), calorimetry and hardness measurement.

It was shown that the most effective alloying element which improved the strength characteristics of the alloy was Sn. The introduction of 0.1-0.2% Sn followed by heat treatment led to the 50% increase in the yield strength, 15% – in the tensile strength in the absence of Sc, Zr and with low content of Mn in the alloy. Sn modified the kinetics of the decomposition, providing high density of precipitate and slow coalescence of nano-sized particles of the strengthening θ' phase, which resulted in higher strength characteristics of the alloy.

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