

## PHENOMENON OF THE ANOMALOUS SUPERSATURATION IN Al-Sc, Al-Mg-Sc ALLOYS RAPID QUENCHED FROM THE LIQUID STATE

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*An ability of Al-Sc and Al-Mg-Sc alloys rapid quenched from the liquid state to be supersaturated by Sc has been studied. Structural states of ribbons rapid quenched from 1000 °C and 1400 °C have been investigated. It has been established that the Al-0.67at.%Sc alloy is anomalous supersaturated by Sc under the quenching from 1400 °C while under the quenching from 1000 °C the 'fan' structure containing the Al<sub>3</sub>Sc-phase has a place. Furthermore the Mg addition to Al-Sc alloys provides the anomalous supersaturation of the solid solution by Sc in all investigated alloys quenched even from 1000 °C*

Key words : *the anomalous supersaturation, rapid quenching, the 'fan' structure, fractal structure*

### 1. Introduction

It is generally known that Sc creates supersaturated solid solution with Al which is decomposed with the precipitation of coherent refractory particles of the Al<sub>3</sub>Sc-phase with LL<sub>2</sub>-type. This phase is isomorphic to the matrix and strengthens Al-alloys. However, according to the Al-Sc phase diagram hardening effect of Sc is limited by maximum solid solubility of Sc (Sc < 0.15at.%). It is common knowledge that the rapid quenching allows increase the solid solubility of alloying elements. Nevertheless an ability of Al-Sc and Al-Mg-Sc alloys rapid quenched from the liquid state to be supersaturated by Sc has not uniquely determined so far. Our preliminary study of the structural state of Al-Sc alloys showed that the variation of the cooling rate under constant quenching temperature does not affect the Al<sub>3</sub>Sc-phase morphology but leads to dispersion of structural constituents. The change of the quenching temperature from 1000 °C to 1400 °C significantly influences on the ribbon structure. The 'fan' structure containing the Al<sub>3</sub>Sc-phase was formed by the rapid quenching from 1000 °C while it was absent by the rapid quenching from 1400 °C [1, 2]. The purpose of presented study was to determine the rapid quenching conditions for obtaining the anomalous supersaturated solid solution by Sc in Al-Sc and Al-Mg-Sc alloys.

### 2. Materials and experimental methods

The alloys were prepared by the melt spinning onto a rotating copper wheel with peripheral speed of 44 m/s. The rapid quenching was carried out from 1000 °C and 1400 °C.

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