

عنوان مقاله:

Effect of Cooling Rate and Grain Refinement on the Microsegregation in Al-4.8 wt.% Cu Alloy

محل انتشار:

سومین کنفرانس بین‌المللی آلومینیوم ایران IIAC2014 (سال: 1393)

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نویسندگان:

m dehnavi - *Department of Materials Engineering and Metallurgy, Ferdowsi University of Mashhad, Mashhad, P.O.*

Box: 91775-1111, Iran

m haddad -sabzevar - *Department of Materials Engineering and Metallurgy, Ferdowsi University of Mashhad,*

Mashhad, P.O. Box: 91775-1111, Iran

h Vafaenezhad - *School of Metallurgy and Materials Engineering, Iran University of Science and Technology (IUST),*

Tehran, Iran

M.H Avazkonandeh-Gharavol - *Department of Materials Engineering and Metallurgy, Ferdowsi University of Mashhad,*

Mashhad, P.O. Box: 91775-1111, Iran

خلاصه مقاله:

Microsegregation is one of the most important phenomena occurs during solidification. It usually results in formation of some unexpected second phases which generally reduce the mechanical properties and workability of casting products. The aim of this research is to study the effect of cooling rate and grain refinement on the microsegregation in Al-4.8 wt.% Cu. For this purpose two series of experiments were designed to investigate the effect of cooling rate and grain refinement on the microsegregation. In first set of experiments, the alloy was melted and cooled in three different rates, i.e. 0.04, 0.42, and 1.08 K/s in a DTA furnace. In the second series of experiments, the effect of grain refinement on the microsegregation at a constant cooling rate of 0.19 K/s was investigated. Al-5Ti-1B master alloy was used as grain refiner. Results showed that by increasing the cooling rate the amount of non-equilibrium eutectic phase increases from 5.1 to 7.4 wt.%, and the minimum concentration of solute element in primary phase is decreased from 1.51 to 1.05 wt.% Cu. But by grain refinement in alloy, the amount of non-equilibrium eutectic phase decreases from 5.5 to 4.7 wt.%, and the minimum concentration of solute element in the primary phase is increased from 0.98 to 1.07 wt.% Cu. So it is concluded that increasing cooling rate in the studied range will increase the microsegregation while grain refinement reduce the microsegregation

کلمات کلیدی:

Cooling rate, Microsegregation, α -Al₂Cu eutectic, Al-Ti-B master alloy

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