

Effect of Lead Content on Physical Properties of the Al-Si Eutectic Alloys

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Abstract : Effect of lead content on the microstructure, mechanical (microhardness, ultimate tensile strength) and electrical resistivity properties of Al-Si eutectic alloys has been investigated. Al-12.6 Si-xSn (x=1, 2, 4, 6 and 8 wt. %) were prepared using metals of 99.99% high purity in the vacuum atmosphere. These alloys were directionally solidified under constant temperature gradient (5.50 K/mm) and growth rate (8.25 $\mu\text{m/s}$) by using a Bridgman-type directional solidification furnace. Eutectic spacing, microhardness, ultimate tensile strength and electrical resistivity were expressed as functions of the composition by using a linear regression analysis. The dependency of the eutectic spacing, microhardness, tensile strength and electrical resistivity on the composition (Sn content) were determined. According to experimental results, the microhardness, ultimate tensile strength and electrical resistivity of the solidified samples increase with increasing the Sn content, but decrease eutectic spacing. Variation of electrical resistivity with the temperature in the range of 300-500 K for studied alloys was also measured by using a standard d.c. four-point probe technique.

Keywords : content elements, solidification, microhardness, strength

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