

Measurements of Physical Properties of Directionally Solidified Al-Si-Cu Ternary Alloy

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Abstract : Al-12.6wt.%Si-2wt.%Cu ternary alloy of near eutectic composition was directionally solidified upward at a constant temperature gradient in a wide range of growth rates ($V=8.25-165.41 \mu\text{m/s}$). The microstructures (λ), microhardness (HV), tensile stress (σ) and electrical resistivity (ρ) were measured from directionally solidified samples. The dependence of microstructures, microhardness and electrical resistivity on growth rate (V) was also determined by statistical analysis. According to these results, it has been found that for increasing values of V , the values of HV, σ and ρ increase. Variations of electrical resistivity for casting Al-Si-Cu alloy were also measured at the temperature in range 300-500 K. The enthalpy (ΔH) and the specific heat (C_p) for the Al-Si-Cu alloy were determined by differential scanning calorimeter (DSC) from heating trace during the transformation from solid to liquid. The results obtained in this work were compared with the similar experimental results in the literature.

Keywords : Al-Si-Cu alloy, microstructures, micro-hardness, tensile stress electrical resistivity, enthalpy

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