

# Comparison of Non-Dendritic A380 Al Alloy Modified by Sr Addition, High Cooling Rate and Pouring in Angular Channel with rheocasting

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## Abstract.

Die-casting is the most common processing of high performance components with aluminum alloys for the automotive and aeronautical industries. The Al-Si alloys with non-dendritic microstructure are gaining interest due to the improvement of mechanical properties by the spheroidal morphology and grain refinement of the microstructure replacing the dendritic arms produced by conventional casting.

The A380 alloy added with 50 ppm of Sr poured at atmospheric conditions into a cooper mold with equal angular channel at 90° modifies the morphology in the primary solid rich in Al, trimming the dendritic arms and getting spheroidal  $\alpha$ -Al phase surrounded by eutectic structure. The mold design aids turbulence flow, stirring so the alloy during solidification; the cooling rate increased by the thin wall of the mold promotes decreased grain size.

Microstructural characterization by High Resolution SEM-EDS at the exit of the angular channel. shows a globular  $\alpha$ -Al phase surrounded by fine Si eutectic structure. The eutectic structure contains the most Si compared to the primary solid. Cu and Fe are located outside from  $\alpha$ -Al phase and eutectic structure forming coarse precipitates as shown in Figure 1. Mechanical characterization by tension tests on the processed A380 alloy is also presented. A comparison of the microstructural and mechanical behavior of the alloys produced by both methods are presented.

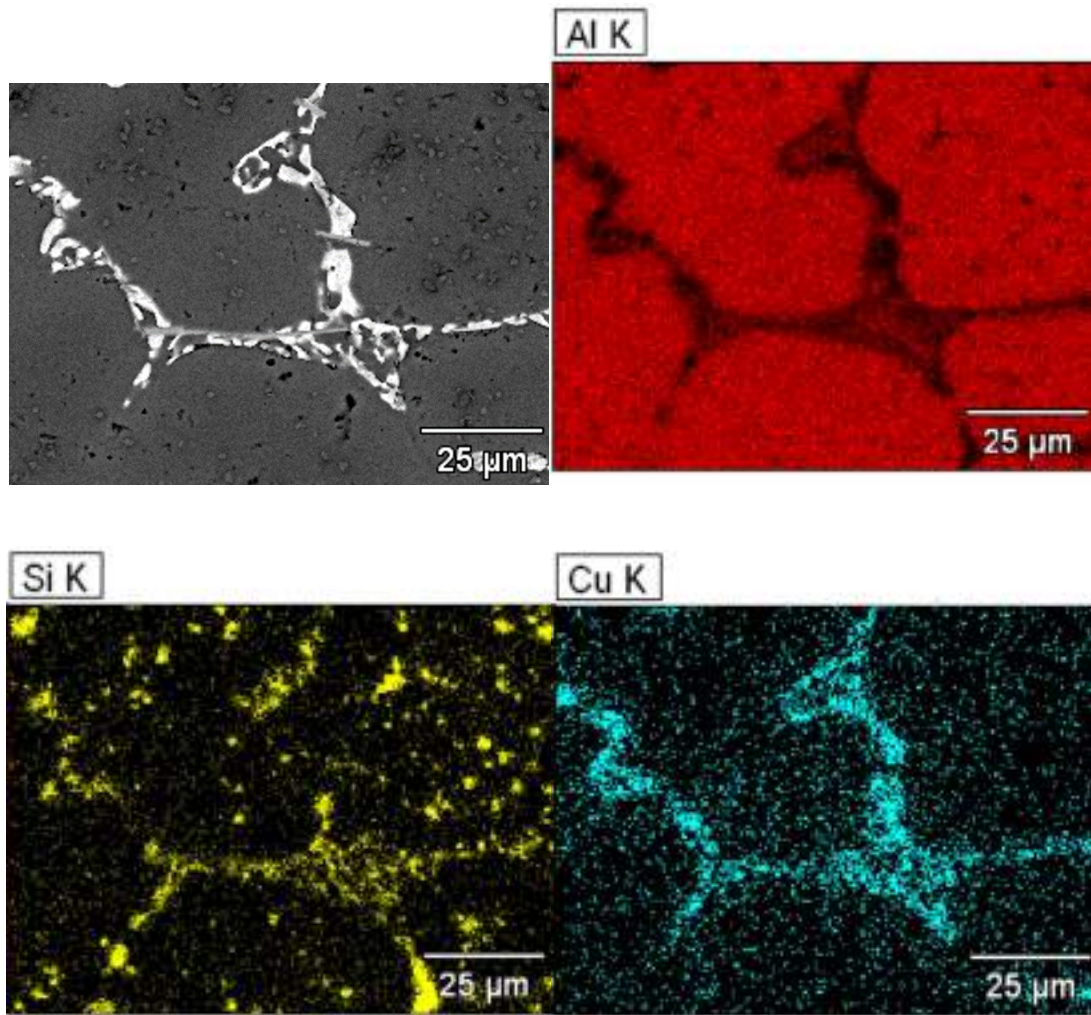


Figure 1. Micrograph and EDS of A380 alloy added with Sr showing globular  $\alpha$  phase rich in Al, distribution of Si in eutectic structure and location of Cu outside of primary solid and eutectic structure.