

The effect of the microstructure upon corrosion resistance of an Al-10wt% Si-2wt%Cu alloy

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In general, the corrosion behavior strongly depends on the structural morphology and chemical composition. The literature shows relationships between the corrosion behavior and the structural morphology of the secondary dendrite spacing [1]. The objective of this study is to investigate the influence of the microstructure of an Al-10wt%Si-2wt%Cu alloy in its corrosion resistance. In this work, an Al-10wt%Si-2wt%Cu alloy was solidified under upward unsteady state heat flow conditions. Heat was directionally extracted only through a water-cooled bottom made of steel (SAE 1020). The aim of the present work is to investigate the influence of the microstructure of this alloy upon corrosion resistance. Experimental results include primary dendrite arm spacings (l_1) and capacitances values (Z_{CPE}). The corrosion behavior was analysed by electrochemical impedance spectroscopy technique conducted in a 3% NaCl solution at room temperature. Coarser dendritic structures tend to improve the corrosion resistance of an Al-10wt%Si-2wt%Cu alloy.

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Reference:

[1] Santos GA, Osório WRR, Garcia A, Neto CM, Goulart PR (2006) Effect of dendritic arm spacing on mechanical properties and corrosion resistance of Al 9wt pct Si and Zn 27wt pct Al alloys. Metall Mater Trans A 37: 2525-2538.