

## Effect of Modifiers (Sr/Sb) and Heat Treatment on the Microstructures and Wear Properties of Al-11Si-3Cu-0.5Mg Alloys

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**Abstract :** In this study, an optical microscope (OM), electron microscope (SEM), electrical conductivity meter (% IACS), hardness test, and wear test were subjected to analyze the microstructure of the wrought Al-11Si-3Cu-0.5Mg alloys. The effect of eutectic silicon morphology and alloy hardness on wear properties was investigated. The results showed that in the cast state, the morphology of eutectic silicon modified by strontium and antimony is lamellar and finer fibrous structure. After homogenization, the eutectic Si modified by Sr coarsened, and the eutectic Si modified by Sb refined due to fragmentation. The addition of modifiers, hot rolling, and solution aging treatment can control eutectic silicon morphology and hardness. The finer eutectic silicon and higher hardness have better wear resistance. During the wearing process, a protective oxide layer, also known as Mechanical Mixed Layer (MML), is formed on the surface of the alloy. The MML has higher stability and cracking resistance in Sr-modified alloys than in Sb-modified alloys. The study found that the wearing behavior of Al-11Si-3Cu-0.5Mg alloy was enhanced by the combination of adding Sr with lower solution time and T6 peak aging.

**Keywords :** Al-Si-Cu-Mg alloy, eutectic silicon, heat treatment, wear property

**Conference Title :** ICMSE 2023 : International Conference on Materials Science and Engineering

**Conference Location :** New York, United States

**Conference Dates :** August 10-11, 2023