

Influence of Al and Si additions on the microstructure and mechanical properties of Mg-4Li alloys

Zilong Zhao, Ziwei Sun, Wei Liang, Yide Wang, Liping Bian



PII: S0921-5093(17)30846-8
DOI: <http://dx.doi.org/10.1016/j.msea.2017.06.077>
Reference: MSA35215

To appear in: *Materials Science & Engineering A*

Received date: 25 November 2016
Revised date: 15 June 2017
Accepted date: 19 June 2017

Cite this article as: Zilong Zhao, Ziwei Sun, Wei Liang, Yide Wang and Liping Bian, Influence of Al and Si additions on the microstructure and mechanical properties of Mg-4Li alloys, *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2017.06.077>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Influence of Al and Si additions on the microstructure and mechanical properties of Mg-4Li alloys

Zilong Zhao^a, Ziwei Sun^a, Wei Liang^{a, b*}, Yide Wang^{a, b}, Liping Bian^{a, b}

^aCollege of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan 030024, China

^bShanxi key laboratory of advanced magnesium-based materials, Taiyuan 030024, China

Abstract

The microstructure and mechanical properties of four hot-rolled alloys, Mg-4Li, Mg-4Li-3Al, Mg-4Li-3Al-0.38Si and Mg-4Li-6Al-0.76Si, (weight percent) were investigated. The results showed that the addition of Al and Al-Si eutectic results in the precipitation of $\text{Al}_3\text{Li}(\text{Mg})$ within the hot-rolled alloys. The $\text{Al}_3\text{Li}(\text{Mg})$ is present as a solid solution of Mg in Al_3Li with an L1_2 superlattice structure, which precipitates as small spherical particles. Another minor constituent present as a precipitate in the Si-containing alloys, Mg-4Li-3(Al-Si) and Mg-4Li-6(Al-Si), is a Mg_2Si phase which is broken into polygonal particles in the hot-rolled alloys. Ultimate tensile strength (UTS) up to 295 MPa was measured for the Mg-4Li-6(Al-Si) alloy, compared with 143 MPa for the Mg-4Li alloy. This improvement is attributed to precipitation strengthening imparted by the $\text{Al}_3\text{Li}(\text{Mg})$ and Mg_2Si phases, as well as solid-solution strengthening due to Al atoms dissolved in the α -Mg matrix of the alloys.

Download English Version:

<https://daneshyari.com/en/article/5455832>

Download Persian Version:

<https://daneshyari.com/article/5455832>

[Daneshyari.com](https://daneshyari.com)