

Accepted Manuscript

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Jiaan Liu, Shouquan Shi, Lianren Zhang

PII: S0167-577X(18)31186-8
DOI: <https://doi.org/10.1016/j.matlet.2018.07.145>
Reference: MLBLUE 24711

To appear in: *Materials Letters*

Received Date: 12 June 2018
Revised Date: 25 July 2018
Accepted Date: 31 July 2018

Please cite this article as: J. Liu, S. Shi, L. Zhang, Enhanced Compressive Properties of Open-cell Mg-Gd-Zn Foams with Long-period Stacking Ordered Phase at Elevated Temperatures, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.07.145>

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Enhanced Compressive Properties of Open-cell Mg-Gd-Zn Foams with Long-period Stacking Ordered Phase at Elevated Temperatures

Jiaan Liu*, Shouquan Shi, Lianren Zhang

Key Laboratory of Automobile Materials (Ministry of Education), College of Materials Science and Engineering, Jilin University, Changchun 130022, P.R. China.

Abstract: The novel open-cell Mg-8Gd-2Zn (wt.%) foams containing long-period stacking order (LPSO) phase were fabricated. The compressive properties of the as-cast Mg-8Gd-2Zn foams and AZ91D foams at different temperatures were investigated. The experimental results show that the Mg-8Gd-2Zn foams mainly consist of α -Mg, LPSO and (Mg,Zn)₃Gd phase. As compared to the AZ91D foams, the Mg-8Gd-2Zn foams exhibit lower compressive strength at room temperature or 100°C, but higher compressive strength at 200 °C or 300 °C. The energy absorption capacity of the foams is also improved at 300 °C. The enhanced compressive properties of the foams at elevated temperatures can be attributed to the high thermal stability of LPSO phase.

Keywords: Metals and alloys; Porous materials; Mg-8Gd-2Zn foams; long-period stacking order phase; Compressive properties; Elevated temperatures.

1. Introduction

Magnesium foams have many excellent properties, such as low density, high specific strength, and high damping property ^[1]. The fabrication methods of magnesium foams are mainly divided into melt foaming method, replication casting method, investment casting method and powder metallurgy method ^[2].

Compressive property is an important characteristic of metal foams. Therefore, great efforts have

* Corresponding author. Tel.: +86 431 85095575.
E-mail address: liuja@jlu.edu.cn.

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