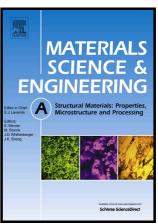
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www.elsevier.com/locate/msea

PII: S0921-5093(17)30266-6

DOI: http://dx.doi.org/10.1016/j.msea.2017.02.095

Reference: MSA34771

To appear in: Materials Science & Engineering A

Received date: 13 February 2017 Accepted date: 24 February 2017

Cite this article as: Shuaiju Meng, Hui Yu, Huixing Zhang, Hongwei Cui, Sung Hyuk Park, Weiming Zhao and Bong Sun You, Microstructure and mechanical properties of an extruded Mg-8Bi-1Al-1Zn (wt.%) alloy, *Materials Science & Engineering A*, http://dx.doi.org/10.1016/j.msea.2017.02.095

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Microstructure and mechanical properties of an extruded Mg-8Bi-1Al-1Zn (wt.%) alloy

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Abstract: In this study, the microstructural evolution and mechanical properties of a newly developed rare

earth free Mg-8Bi-1Al-1Zn (BAZ811, in wt.%) alloy were investigated and compared with those of a

commercial AZ31 alloy. The as-extruded BAZ811 alloy with much finer grain size shows more

homogeneous dynamical recrystallized (DRXed) microstructure and weaker basal texture than those of

AZ31 alloy. In addition, compared with bimodal structure AZ31 alloy containing only relatively coarse and

sparse Al₈Mn₅ phases, the coexistence of strip-like fragmented Mg₃Bi₂ precipitate and nano-size Mg₃Bi₂

particles in the microstructure was observed in BAZ811 alloy. Moreover, the BAZ811 alloy exhibits a

tensile yield stress of 291 MPa, an ultimate tensile strength of 331 MPa, an elongation to failure of 14.6%

as well as a reduction in yield asymmetry, which is mainly attributed to the combined effects of grain

refinement and micro-scale broken Mg₃Bi₂ particles together with nano-scale spherical Mg₃Bi₂ precipitates.

The strain hardening behavior of both BAZ811 and AZ31 alloys were also discussed in terms of

microstructure variation.

Keywords: Mg-Bi alloy; Extrusion; Microstructure; Mechanical Properties;

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