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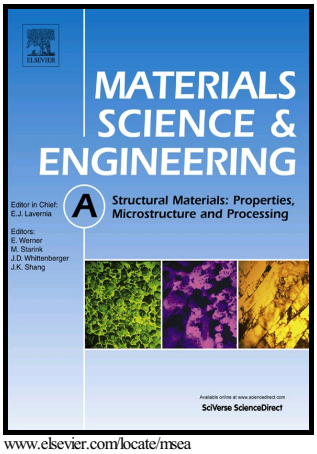

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Microstructure and mechanical properties of an extruded Mg-8Bi-1Al-1Zn (wt.%) alloy

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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 Al_8Mn_5 phases, the coexistence of strip-like fragmented Mg_3Bi_2 precipitate and nano-size Mg_3Bi_2 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 Mg_3Bi_2 particles together with nano-scale spherical Mg_3Bi_2 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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