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Effect of TiB₂-doping on the microstructure and mechanical properties of Mg-Zn-Y-Mn alloy

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Abstract:

The effect of TiB₂ doping on the microstructure and mechanical properties of the Mg_{94.4}Zn_{2.5}Y_{2.5}Mn_{0.6} alloy was investigated in this study, which shown that the volume fraction of long-period stacking ordered (LPSO) structures was significantly increased and the LPSO/W interface shown anisotropy with TiB₂ doping to the Mg_{94.4}Zn_{2.5}Y_{2.5}Mn_{0.6} alloy. When the doping amount of TiB₂ was 0.006wt%, the Mg_{94.4}Zn_{2.5}Y_{2.5}Mn_{0.6} alloy appeared uniform equiaxed dendrites and the volume fraction of the LPSO phase was 3.65 times higher than of the TiB₂-free alloy. Meanwhile, Mg_{94.4}Zn_{2.5}Y_{2.5}Mn_{0.6} alloy with 0.006 wt% TiB₂-doping shown optimal mechanical performance with ultimate tensile strength and elongation of 240 MPa and 13.5%, respectively.

Keywords: TiB₂; Mg alloys; LPSO; Doping; Mechanical performance

1. Introduction

For nearly ten years, the Mg-RE-Zn alloys have aroused widespread concern due to its distinctive grain structure, special strengthening phase and excellent mechanical properties ^[1, 2]. In the family of Mg-RE-Zn alloys, Mg-Zn-Y grades were one of the most representative alloys. Scholars have explored in detail that LPSO-phase, I-phase and W-phase can be found in Mg-Zn-Y alloy according to the

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