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Effect of pre-solution treatment on mechanical properties of**as-extruded $\text{Mg}_{96.9}\text{Zn}_{0.43}\text{Gd}_{2.48}\text{Zr}_{0.15}$ alloy**

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Abstract:

The effect of pre-solution (T4) treatment on microstructure and mechanical properties of the as-extruded $\text{Mg}_{96.9}\text{Zn}_{0.43}\text{Gd}_{2.48}\text{Zr}_{0.15}$ alloy was investigated. The results suggested that the long period stacking ordered (LPSO) structure with a lamellar-shape morphology transformed from the decomposition of the primary Mg_3Gd -type phase after the pre-solution (T4) treatment at 773 K for 12 h, and then grown into the block-shape LPSO structure until 120 h. The kinking band deformation occurred in the lamellar-shape and the block-shape LPSO structure during hot extrusion (HE). The morphologies and their kinking band of the LPSO structures influenced mechanical properties of the as-extruded alloys greatly. The best mechanical properties were found in the alloy B (T4 for 12 h+ HE), which was ascribed to the lamellar-shape LPSO structure and its kinking deformation. Nevertheless, the mechanical properties of the alloy (T4 for 70 h + HE and 120 h+ HE) decreased because of the fracture of the block-shape LPSO structure.

Keywords: Mg-Zn-Gd-Zr alloys; Long period stacking ordered; Kinking band; Mechanical properties

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