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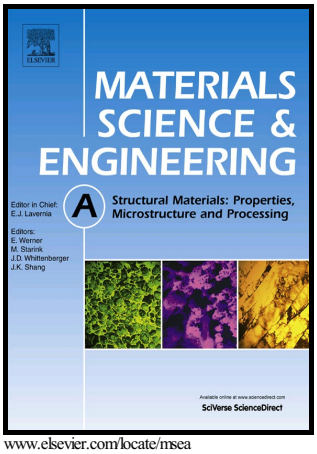

www.elsevier.com/locate/msea

PII: S0921-5093(16)30837-1
DOI: http://dx.doi.org/10.1016/j.msea.2016.07.073
Reference: MSA33904

To appear in: *Materials Science & Engineering A*

Received date: 16 November 2015
Revised date: 15 July 2016
Accepted date: 16 July 2016

Cite this article as: Kai Wen, Ke Liu, Zhaohui Wang, Shubo Li and Wenbo Du, Effect of pre-solution treatment on mechanical properties of as-extruded $Mg_{96.9}Zn_{0.43}Gd_{2.48}Zr_{0.15}$ alloy, *Materials Science & Engineering A* http://dx.doi.org/10.1016/j.msea.2016.07.073

Effect of pre-solution treatment on mechanical properties of as-extruded $Mg_{96.9}Zn_{0.43}Gd_{2.48}Zr_{0.15}$ alloy

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Abstract:

The effect of pre-solution (T4) treatment on microstructure and mechanical properties of the as-extruded $Mg_{96.9}Zn_{0.43}Gd_{2.48}Zr_{0.15}$ 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 and120 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