

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第17卷 第1期 (总第94期) 2007年1月

 [PDF全文下载]

文章编号: 1004-0609(2007)01-0030-05

块体纳米晶Al-Zn-Mg-Cu合金的热处理

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摘要: 利用液氮球磨、真空热压和挤压工艺制备块体纳米晶Al-Zn-Mg-Cu合金, 并对其固溶和时效处理进行研究, 得到时效硬度曲线。利用X射线衍射仪和透射电镜对该合金热处理前后的微观组织进行分析, 结果表明: 块体制备过程中析出的MgZn₂可以通过固溶处理使其回溶并在时效后沉淀析出; 热压后晶粒尺寸为50-100 nm, 热处理后晶粒长到100 nm, 部分晶粒达到200 nm。

关键字: 铝合金; 块体纳米晶; 低温球磨; 固溶处理; 时效处理; 微观组织

Heat treatment of bulk nanocrystalline Al-Zn-Mg-Cu alloy

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Abstract: Bulk nanocrystalline Al-Zn-Mg-Cu alloy was fabricated by cryomilling combined with vacuum hot pressing and extrusion. The aging-curve was obtained. The crystal structures and microstructures before and after heat treatment were investigated by X-ray diffractometry (XRD) and transmission electron microscopy (TEM), respectively. The results show that the deposition (MgZn₂) of consolidation can be dissolved again by solid-solution, and precipitated during aging. The grain sizes of the bulk nanocrystalline Al-Zn-Mg-Cu alloy produced by vacuum hot pressing are 50–100 nm, some of them grow to 100 nm even part of them reach 200 nm after heat-treatment.

Key words: aluminum alloy; bulk nanocrystalline; cryomilling; solid-solution; aging; microstructure

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