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镁合金AZ61的流变挤压工艺和组织特征

张少明^{1, 2}, 杨必成¹, 樊中云³, 徐 骏¹, 石力开¹, 陈国良²

- (1. 北京有色金属研究总院, 北京 100088;
2. 北京科技大学 新金属材料国家重点实验室, 北京 100083;
3. Brunel University, Uxbridge, Middlesex UB8 3PH, UK)

摘 要:采用双螺旋流变铸造技术制备镁合金AZ61铸锭, 并与常规铸造组织进行对比。常规铸造得到粗大的树枝晶, 而流变铸造得到细小的球状晶, 平均晶粒尺寸约40 μm 。采用常规热挤压工艺和流变挤压工艺分别挤压出直径22 mm的棒材, 分析比较流变挤压与常规热挤压过程中, 挤压力大小和挤压速率的关系, 观察不同工艺下得到的微观组织。结果表明, 常规挤压为动态再结晶组织, 晶粒形状和大小与挤压温度和速度密切相关; 流变挤压中浆料在通过挤压模时凝固, 得到平均晶粒尺寸约8 μm 的铸态组织, 其原因是大量二次形核的核心得以存留并长大。

关键字: 镁合金; 流变铸造; 流变挤压; 二次形核

Rheo-extrusion of AZ61 Mg alloy and its microstructure

ZHANG Shao-ming^{1, 2}, YANG Bi-cheng¹, FAN Zhong-yun³, XU Jun¹, SHI Li-kai¹, CHEN Guo-liang²

- (1. General Research Institute for Nonferrous Metals, Beijing 100088, China;
2. State Key Laboratory for Advanced Metals and Materials, University of Science and Technology Beijing, Beijing 100083, China;
3. Brunel University, Uxbridge, Middlesex UB8 3PH, UK)

Abstract: The microstructure of AZ61 Mg alloy made by the methods of normal cast and twin-screw rheo-cast was investigated. The grains are coarse dendrite in normal cast billet, while they are tiny ground grains in rheo-cast billet with the average grain size of about 40 μm . The d 22 mm rods were fabricated by hot extrusion and rheo-extrusion separately, the microstructure of these rods and the relationship between the extrusion force and velocity were researched. The result shows that dynamic recrystallization happens in the hot extrusion, the shape and size of the grains are determined by the extrusion temperature and velocity. In the process of rheo-extrusion, slurry solidification occurs and the tiny ground grains form in the extrusion mould with the average grain size of about 8 μm . The reason of grain refinement is that lots of nucleus formed in the secondary nucleation get survived and grow up.

Key words: magnesium alloy; rheo-cast; rheo-extrusion; secondary nucleation

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地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-8876765, 8877197, 8830410 传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn