

### 论文摘要

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## Zr对2E12铝合金显微组织和力学性能的影响

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**摘要:** 研究Zr元素对2E12铝合金T4态显微组织及力学性能的影响。结果表明: 添加质量分数0.3%的Zr元素可以细化合金的铸态组织, 使晶粒平均尺寸从42  $\mu\text{m}$ 降低至30  $\mu\text{m}$ 左右, 并促使晶粒等轴化; 锻造过程中Zr可以抑制合金的再结晶, 防止晶粒长大, 改善2E12-T4态的显微组织, 提高合金的力学性能, 其抗拉强度、屈服强度、伸长率和断面收缩率分别提高5.4%、11.3%、9.7%和12.6%; 合金的强化机理主要包括晶粒细化、颗粒弥散强化及形变强化。

**关键字:** 2E12铝合金; 钆; 电磁连铸; 显微组织; 力学性能

## Effects of Zr on microstructures and mechanical properties of 2E12 aluminum alloy

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**Abstract:** Effects of Zr on microstructures and mechanical properties of 2E12 aluminum alloy were studied. The results show that compared with 2E12 alloy the as-cast microstructures of alloy with 0.3% (mass fraction) Zr can be refined of grain sizes decreasing from 42  $\mu\text{m}$  to 30  $\mu\text{m}$  and characterized with equiaxed grains. Moreover, recrystallization during the forging process can be inhibited.  $\sigma_b$ ,  $\sigma_{0.2}$ ,  $\delta$  and  $\psi$  are improved with increasing Zr content, and the improving amplitudes reach 5.4%, 11.3%, 9.7% and 12.6%, respectively. Combined with the microstructures of alloys, the strengthening mechanism are mainly grain-refine, particles dispersion strengthening and improvement of deformation strengthening.

**Key words:** 2E12 aluminum alloy; Zr; electromagnetic continuous casting; microstructure; mechanical properties

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