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挤压工艺对$AK_{4-1ч}$合金棒材晶粒大小的影响

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摘 要：通过调整合金成分分别配制了添加Zr,AlTiB,AlTiC和RE的$AK_{4-1ч}$实验铝合金,经过2种不同的工艺生产棒材,在室温下测量其淬火时效态抗拉强度,用金相显微镜和扫描电镜观察和分析了合金在不同加工工艺状态下的显微组织和结构,并判定其晶粒度.结果表明:在设计合金成分时,要精确控制Cu的含量在2.0%~2.6%,以免生成难溶的含Cu相,降低合金的强度;多向强应变可细化晶粒,提高合金的力学性能;随变形程度的增加,晶粒尺寸减小;制定挤压工艺时,为避免产生周期性裂纹,建议挤压比取为25左右.

关键字：Al-Mg-Cu-Fe-Ni合金;晶粒细化;挤压;多向应变

Influence of extrusion process on grain size of $AK_{4-1ч}$ rod

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Abstract: Al-Cu-Mg-Fe-Ni alloys with addition of Zr, AlTiB, AlTiC and REwere prepared by adjusting the component of the alloys. Rods were produced through two different processes. The mechanical properties of this material after being quenched and aged were tested at ambient temperature. The microstructures of the alloys in different conditionswere observed by optical microscope and SEM, and also the grains size was measured. The results show that during the design the component of the alloys, the content of Cu must be controlled accurately between 2. 0% ~ 2. 6%, and m(Fe)∶m(Ni) should be 1∶1, lest the strength of the alloys be reduced and indissoluble Cu-included phase appear.Multiaxial strain could refine the grains and improve the properties of the alloys; the grains size would be decreased by increasing the strain, and the periodic crack would be prevented by limiting the extrusion temperature and the extrusion ratio.

Key words: Al-Mg-Cu-Fe-Ni alloys; grain-refine; extrusion; multiaxial strain

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