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TiB₂+SiC混杂颗粒增强的ZL109复合材料

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摘要: 在原位合成工艺制备TiB₂颗粒增强ZL109复合材料基础上, 通过加入SiC颗粒增强铝基复合材料, 制备了TiB₂+SiC混杂颗粒增强ZL109复合材料。结果表明: TiB₂颗粒在铝合金熔体中具有良好的悬浮稳定性, 而且在TiB₂+SiC混杂颗粒增强铝基复合材料中, 由于TiB₂颗粒的存在, 有效抑制了SiC颗粒的沉降行为, 熔体经45 min静置仍可获得颗粒分布均匀的复合材料, 这使得制备高模量复杂形状零件的直接铸造成型成为可能; 在TiB₂+SiC混杂颗粒增强铝基复合材料中, 颗粒的混杂作用对复合材料弹性模量的提高具有协同作用, 能够大幅度提高复合材料的弹性模量, 其弹性模量较计算值提高14.7%; 对于(10%TiB₂+10%SiC)/ZL109混杂增强铝基复合材料, 经T6热处理后, 材料抗拉强度可达到275 MPa, 弹性模量提高到105.8 GPa。

关键字: ZL109复合材料; 原位合成; 搅拌铸造; 混杂增强

ZL109 composite reinforced by hybrid particles of TiB₂ and SiC

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Abstract: Based on in-situ preparation of TiB₂ particle reinforced ZL109 composite, hybrid particles of TiB₂ and SiC reinforced ZL109 composite were fabricated by adding SiC particle reinforced ZL109 composite. The result shows that TiB₂ particles have excellent deposition resistance in the melt aluminum and the deposit velocity of SiC particles is reduced in melt (TiB₂+SiC)/ZL109 composite with addition of TiB₂ particles. As the hybrid particles have synergetic effect on raising the elastic modulus of composite, the elastic modulus of hybrid particles reinforced composite is much higher than that of the composite reinforced by one kind of particle, and the actual value of elastic modulus is 14.7% higher than calculated value. After T6 heat treatment, the tensile strength of (10%TiB₂+10%SiC)/ZL109 composite can reach 275 MPa and the elastic modulus increases to 105.8 GPa.

Key words: ZL109 composite; in-situ reaction; stir casting; hybrid reinforcement

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