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Si对喷射成形AZ91镁合金微观组织的影响

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摘 要：在保护气氛中采用喷射成形技术制备AZ91和AZ91+2.0%Si镁合金，采用OM、SEM、XRD及TEM等技术分别对合金的微观组织进行观察和分析。结果表明：与相同成分的铸造镁合金相比，喷射成形技术显著细化合金组织；喷射成形沉积态AZ91镁合金具有均匀、细小的等轴晶组织，平均晶粒尺寸约为17 μm，离异共晶β-$Mg_{17}Al_{12}$相在晶界的偏析被有效改善；对于喷射成形AZ91+2.0%Si镁合金，喷射成形过程中高的冷却速度抑制了Mg_2Si相的长大，细小的Mg_2Si相呈现为近球形或多边形态，与基体结合良好且弥散分布，并可以作为α-Mg异质形核核心，使合金组织得到充分细化。

关键字：AZ91镁合金；喷射成形技术；Mg_2Si；晶粒细化

Effect of Si on microstructure of spray formed AZ91 Mg alloy

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Abstract: AZ91 and AZ91+2.0%Si Mg alloys were prepared by spray forming technology in protecting atmosphere. The microstructures were studied by optical microscopy (OM), scanning electron microscopy (SEM), X-ray diffractometry (XRD) and transmission electron microscopy (TEM). The results show that the microstructures of spray formed magnesium alloys are fine-grained compared with as-cast ones with the same compositions. The microstructure of as-sprayed AZ91 Mg alloy is uniform, fine and equi-axed. The average size of particles is about 17 μm, and the nonuniform precipitation of divorced eutectic β-$Mg_{17}Al_{12}$ is effectively improved. In the microstructure of as-sprayed AZ91+2.0%Si, the high cooling

speed during spray forming process restrains the growth of Mg_2Si. Mg_2Si existing in the fine grains, presents polygonal or near round shape, which uniformly distributes and can be the heterogeneous core of α-Mg, so the spray formed AZ91 Mg alloy is sufficiently refined by Si added.

Key words: AZ91 Mg alloy; spray forming technology; Mg_2Si; grain refinement

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