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侧部导入超声处理对共晶Al-Si合金凝固特性的影响

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摘 要：研究了功率超声处理对ZL102铝硅合金凝固特性的影响。研究发现：在凝固过程中进行超声处理能显著细化共晶硅相，改善其形貌及分布；通过对比未处理、300 W超声波及500 W超声波处理条件下铝硅合金不同部位的力学性能及断口形貌，发现功率超声处理明显提高铝硅合金的力学性能，且随着处理功率的增大，合金的力学性能随之提高。并分析了超声波在铝硅合金中传播时衰减的原因，通过数学方法得到衰减方程，并探讨了其衰减规律。

关键字： 共晶Al-Si合金；功率超声波；凝固组织；力学性能；衰减

Influence of side ultrasonic treatment on solidification characterization of Al-Si eutectic alloy

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Abstract: The influence of side-introduced power ultrasonic treatment on the solidification characterization of ZL102 Al-Si alloy was discussed. The results show that the ultrasonic treatment on the alloy during solidification can refine the structure, develop the morphology and distribution of eutectic silicon. The mechanical properties and fractographs of the alloy by treatments without ultrasonic, 300 W ultrasonic and 500 W ultrasonic treatment were also compared. The results indicate that the power ultrasonic treatment can enhance the tensile strength obviously, and the mechanical properties increase with increasing ultrasonic power. The reason of ultrasonic attenuation was analyzed and the law of ultrasonic attenuation into the melt was discussed by the mathematical method.

Key words: Al-Si eutectic alloy; power ultrasonic; solidification structure; mechanical property; attenuation

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