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微量Si和Ag对低Cu/Mg比Al-Cu-Mg合金 时效行为及微观组织结构演化的影响

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摘要: 采用计算机模拟与透射电镜相结合研究微量Si和Ag对低Cu/Mg比Al-Cu-Mg合金时效行为和微观组织结构演变的影响。结果表明: 微量Si和Ag的添加改变了该合金的时效析出过程, 显著增强了合金的时效硬化效应。微量Si的存在导致了合金时效早期Mg原子团簇、Cu-Mg原子团簇弥散化, 而微量Ag的添加导致形成大量Mg-Ag原子团簇。微量Si和Ag极大地改变了合金时效早期的原子团簇化过程从而导致了时效过程中微观组织结构的不同演化过程。

关键字: 铝合金; 时效; 微观结构; Si; Ag

Effects of Si and Ag additions on ageing behaviour and microstructure evolution of Al-Cu-Mg alloy

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Abstract: The effects of trace additions of Si and Ag on the ageing behaviour and microstructure evolution of low Cu/Mg ratio Al-Cu-Mg alloy were investigated by using analytical transmission electron microscopy and Monte Carlo simulation. The results indicate that the age hardening response can be enhanced by the trace Si addition as well as Ag. The Monte Carlo simulation results show that the addition of Si results in a refinement of Mg clusters and Cu-Mg clusters, and the addition of Ag promotes the formation of lots of Mg-Ag clusters. Trace Si and Ag additions significantly alter the clustering process during early stages of ageing, resulting in different microstructural evolution processes during subsequent aging process.

Key words: aluminium alloy; ageing; microstructure; Si; Ag

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