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Al-4%Cu过饱和合金在强磁场中时效行为

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摘 要:采用差示扫描量热仪分析并结合显微硬度测试、电子探针分析、透射电镜观察研究了10-T稳恒强磁场对Al-4%Cu(质量分数)合金130℃时效过程中各沉淀相析出行为的影响。结果表明:在低温时效初期强磁场的引入加速了铜的扩散,降低了G.P.(I)区的溶解激活能,促进其溶解,各沉淀相的析出与溶解温度均向低温处移动,时效进程加快;另外,强磁场时效后沉淀相尺寸减小;施加强磁场试样的硬度明显高于未施加磁场试样的,时效硬化效果加强。

关键字: Al-Cu合金; 强磁场; 时效行为; 沉淀相

Ageing behavior of super-saturated Al-4%Cu alloys under high magnetic field

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Abstract: The effects of 10-T magnetic field on ageing behavior of the precipitated phases of Al-4%Cu alloys aged at 130℃ were investigated by differential scanning calorimetry analysis, Vickers micro-hardness test, electron probe microanalysis and transmission electron microscopy observation. The results show that high magnetic field improves the diffusion of Cu atom, lowers the solution active energy of G.P.(I) zone, speeds its solution and shifts the precipitated and dissolved temperature of the phases to lower points, thus accelerates the ageing course during the early stage at low temperature. Furthermore the high magnetic field reduces the dimension of the phases. The microhardness of the field-treated specimen is always higher than those of the non-field ones that indicates the high magnetic field strengthens the hardening effect.

Key words: Al-Cu alloys; high magnetic field; ageing behavior; precipitated phases

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