



## 论文摘要

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### 基于人工神经网络的Cu与Mg低质量比Al-Cu-Mg合金 时效强化预测模型

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**摘要:** 通过硬度检测和透射电镜(TEM)观察, 研究低Cu/Mg质量比Al-Cu-Mg合金时效强化机理, 建立神经网络预测模型, 使其在实验条件范围内对时效力学性能进行有效预测。在实验基础上, 采用Levenberg-Marquardt算法训练神经网络, 建立以时效温度与时间为输入参数和硬度为目标函数的函数关系。结果表明: 预测值与实验结果吻合较好, 并证明了网络的可靠性与泛化能力; 当时效温度越高时, 达到峰值时效的时间越短, 峰值时效的硬度也越大; 在160-190 °C时效温度范围内, 合金峰值硬度随时效温度的升高而下降, 对应硬度峰值的时效时间缩短。

**关键词:** 时效; Levenberg-Marquardt算法; 神经网络; 析出相; 模型

### Ageing prediction model for low mass ratio of Cu to Mg of Al-Cu-Mg alloy based on neural network

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**Abstract:** On the basis of experiment, neural network model was established, which could predict the mechanical performance of ageing Al-Cu, -Mg alloy with low mass ratio of Cu to Mg effectively. In order to obtain the relationship between the parameters and the mechanical performance, experiments were carried out in which the ageing temperature and time were input parameters and hardness was output parameter. The function between the input and output parameters were constructed by neural network trained by Levenberg-Marquardt algorithm. The result shows that the model has high precision and good performance, which provides theoretical foundation for further study of the effect rule of ageing parameters on mechanical property and for optimal design of the ageing process.

**Key words:** ageing; Levenberg-Marquardt algorithm; neural network; precipitation; modeling

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