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母相时效对Cu-17Al-10Mn合金相变温度和形状记忆性能的影响

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摘 要: 研究母相时效过程中Cu-17Al-10Mn(摩尔分数, %)形状记忆合金马氏体转变温度 M_s 和形状记忆性能的变化规律。结果表明: 合金淬火态的 M_s 比室温的低, 室温时合金为无序母相结构, 低温时可转变为马氏体; 随着时效温度的提高, Cu-17Al-10Mn合金的 M_s 和形状恢复率均逐渐升高, 并在150 °C时效15 min后达到最大值, 这主要归因于淬火空位的逸出使其对母相的钉扎作用减弱; 随着时效温度的进一步提高, 由于母相分解为贝氏体, 合金的 M_s 和形状恢复率都下降, 在250 °C时效15 min后, 母相完全分解, 合金的形状恢复率降低到零。

关键字: Cu-17Al-10Mn合金; 形状记忆合金; 时效效应; 马氏体相变

Ageing effect on martensite transformation temperature and shape memory properties of Cu-17Al-10Mn alloy

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Abstract: The changing rules of martensite transformation temperature and shape memory properties for Cu-17Al-10Mn (molar fraction, %) alloy during parent phase aging were studied. The results show that the M_s of as-quenched alloy is less than that at room temperature. The as-quenched alloy, which has low degree of order at room temperature, can make thermoelastic martensite transformation with further cooling. With increasing ageing temperatures, M_s as well as the shape recovery ratio of the alloy increases and reaches the maximal value at 150 °C due to the escape of quenched-in vacancies. Then M_s and shape recovery ratio of the alloys decrease with further increasing ageing temperature because of bainite

precipitated from parent phase. After ageing at 250 °C for 15 min, the shape recovery ratio of the alloys decreases to zero due to the complete transformation to bainite from parent phase.

Key words: Cu-17Al-10Mn alloy; shape memory alloy; ageing effect; martensite transformation

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