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论文

Ni-Ti-Nb宽滞后形状记忆合金的形变诱发马氏体相变及其可逆性

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摘要： 用透射电镜、高分辨电镜、不同温度下的拉伸试验以及电阻率-温度曲线测试研究了Ni-Ti-Nb合金形变诱发马氏体相变及其可逆性，分析了形变诱发马氏体的稳定性和可逆性与其变体界面结构之间的关系。结果表明，Ni－Ti－Nb合金在Ms-M温度区间加应力时发生应力诱发马氏体相变，而在M以上温度加应力时，发生应变诱发马氏体相变形变对Ni-Ti-Nb合金的应力诱发纪氏体异面结构有明显影响，随着拉伸变形量的增加，应力诱发马氏作界面结构由平直、清晰、具有良好的共格性，逐步变为界面上出现台阶和畸变层，部分失上共格，直至界面上出现紊乱层，明显失去共格。与之相应，随形变量增加，形变应力诱发马氏体的稳定性提高，可逆性下降在适当的变形条件下，经适量又形的形变应地诱发马氏体兼具有高的稳定性和良好的可逆性

关键词： Ni-Ti-Nb合金 形变诱发马氏体相变 马氏体界面结构 稳定性和可逆性

DEFORMATION-INDUCED MARTENSITIC TRANSFORMATION AND ITS REVERSIBILITY IN Ni-Ti-Nb WIDE HYSTERESIS SHAPE MEMORY ALLOYS

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Abstract: The deformation-induced martensitic transformation and its reversibility in Ni-Ti-Nb alloys have been studied by means of tensile test at various temperatures, electrical resistance measurement, TEM and HREM observations. The relationship between the stability and reversibility of deformed stress-induced martensite and its variant interface structure was analyzed. It is shown that stress and strain induced martensitic transformations occur,respectively, when Ni-Ti-Nb alloys are deformed between Ms and Ms temperatures and above Ms temperatures. The deformation has obvious effect on interface structure of stress-induced martensite. The interface of stress-induced martensite (SIM) is straight and well-defined as well as perfectly coherent. However, ledges and distorted layers are formed in the interface of SIMs subjected to low deformation strain and the interfacial coherence is damaged to some extent. With the increasing of deformation strain, the ledges and distortedlayers gradually turn into the confused layers and the interfaces of martensite variants completely lose coherence. Accordingly, the stability of deformed stress-induced martensite increases and its reversibility decreases with increasing tensile strain. Under the appropriate deformation conditions, the deformed stress-induced martensite subjected to suitable deformation strains has both high stability and good reversibility.

Keywords: Ni-Ti-Nb alloy deformation-induced martensitic transformation interface structure of martensite stability and reversibility

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