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Influences of transformation behavior and precipitates on the deformation behavior of Ni-rich NiTi alloys

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Abstract:

Influences of transformation behavior and precipitates on the deformation behavior of Ni-rich NiTi alloys were thermodynamically and experimentally investigated in present work. According to the thermodynamic analysis, the critical stress presents the same linear relationship with martensitic transformation temperature for all Ni-rich NiTi alloys. The thermodynamic results were demonstrated by the experimental results after aging treatment of Ni-rich NiTi alloys with compositions of 51.5, 51 and 50.5 at.% Ni, even for the aged alloys with R phase transformation. Meanwhile, evolution of precipitate size and volume fraction was clearly discussed for Ni-rich NiTi alloys with different aging conditions. Different from the critical stress, transformation behavior presents no obvious influence on the yield stress of the Ni-rich NiTi alloys. The yield stress is mainly determined by Ni₄Ti₃ precipitates, which increases with increasing the precipitate volume fraction and decreases with increasing the precipitate size.

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