

Influence of Elements with High Affinity to Oxygen on Microstructure and Phase Composition of Ni-Ti Alloy

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Approximately an equiatomic alloy of nickel and titanium is known as nitinol. Nitinol possesses a lot of interesting properties such as shape memory, pseudoplasticity, superelasticity and corrosion resistance. NiTi alloys are usually industrially produced by melting process, but the products have not good quality and purity. Powder metallurgy with reactive sintering is considered as one of the route of production of NiTi alloys. However, the other phases are formed during this process (Ti_2Ni , Ni_3Ti). The presence of Ti_2Ni phase is unwanted in this alloy. It is stabilized by oxygen and its main disadvantage is brittleness. In this work we prepared NiTi shape memory alloys by Self-propagating High-temperature Synthesis (SHS). Results showed the possibility of modification of the phase composition by alloying with other elements, which have higher affinity to oxygen. Carbon was found to reduce the amount of undesirable Ti_2Ni phase, while in presence of zirconium this phase reduces its hardness which implies the loss of brittleness.

Keywords: NiTi alloy, Self-propagating High-temperature Synthesis, Ti_2Ni phase

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