

High Temperature NiTiHf Shape Memory Thin Films Fabricated by Simultaneous Sputter Deposition from Elemental Targets

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NiTiHf thin films with varying hafnium contents up to 28.7at% were fabricated using simultaneous sputter deposition from separate Ni, Ti, and Hf targets onto unheated substrates. The required film composition was achieved by adjusting the power ratio to the targets. The as-deposited films were amorphous; and post deposition annealing was performed at 550°C, slightly above their crystallization temperatures. The crystallization temperature of the films varied as a function of Hf concentration, and was as high as 520°C at a Hf content of 28.7at%. 2μm thick crystallized films with 10at% or greater Hf were martensitic at room temperature. DSC analysis demonstrated that above 10at%Hf additions the transformation temperatures increased considerably over NiTi, reaching as high as 414 °C (A_p) at a Hf content of 24.4 at.%. Our results confirm that these films are comparable with bulk NiTiHf alloy of similar composition.

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