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INVESTIGATION OF SHAPE MEMORY ALLOY REINFORCED ALUMINIUM METAL MATRIX COMPOSITE

Abstract

NiTi alloys (also known as SMAs) have recently attracted significant attention in aerospace and biomedical applications due to their unique functional features like their shape memory effect, superelasticity and bio-compatibility.The primary obstacle to the widespread adoption of SMAs is the high cost of virgin-NiTi used as a raw material for such applications. So, the primary goal of this study is to fabricate a composite of NiTi and Aluminium taken at various sizes (micro and nano). To determine the Phase Transformation behaviour and shape memory effects of fabricated composites in order to provide an economic alternative to virgin NiTi. Also deriving a relationship between samples' mechanical properties (such as microhardness and porosity) with their microstructure pattern and composition (Al & NiTi). The NiTi 30 wt.% is reinforced with the aluminium to fabricate the metal Matrix composite via powder metallurgy. In the present study mechanical properties of micro sized NiTi 30 wt.% composites are investigated.The effects of various processing parameters such as compaction pressure 100 to 150 MPa, sintering time of 45 min, temperature at 550 degree Celsius and sample design are discussed. Shape Memory Composites are trained by annealing at high temperatures and cold forming at sub zero temperatures. After the analysis of microstructure, relevant results are displayed and observations were described. The study resulted that micro hardness of composite was enchanced by 300% as compared to pure aluminium sample.