

# Effects of using Mechanically Alloyed reAgent on Self-Propagating High-Temperature Synthesis of NiTi

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## ABSTRACT

Mechanical alloying (MA) was incorporated in self-propagating high-temperature synthesis (SHS) to fabricate porous NiTi shape memory alloy (SMA) for biomedical applications. By using mechanically alloyed Ni-Ti as reagent, the secondary intermetallic phases (i.e. Ti<sub>2</sub>Ni, Ni<sub>3</sub>Ti) and unreacted Ni were significantly reduced. Results also showed that the MA reagent helped advancing the reaction and “energized” the chemical evolution. An addition of 25% MA Ni-Ti reagent produced porous NiTi containing NiTi as a major phase with an average porosity of 55.23 vol.% and a general pore size of 100µm to 500µm at a preheat temperature of 200 °C. Further increase of MA Ni-Ti to 50% allowed the synthesis reaction to occur at ambient temperature (i.e., 25 °C) and resulted in no unreacted Ni. SHS of porous NiTi using pure elemental powders was used for comparison and the results showed the presence of unreacted Ni, which is detrimental to the medical use. Furthermore, it required a preheat temperature of 200°C to initiate the propagation.