Synthesis of nano crystalline NiTi by mechanical alloying and nanocrystalization of amorphous phase

Shahriyar Akbarinia*, Seyyed Khatiboleslam Sadrnezhad2, Alireza Hosseini3, Farzad Akbarinia4
1- M.Sc, Young Researchers Club, Miyaneh Branch, Islamic Azad University, Miyaneh, Iran
2- Professor, Department of Materials Science and Engineering, Sharif University of Technology, Tehran, Iran
3- Ph.D Student, Materials and Energy Research Center, Karaj, Iran
4- M.Sc, Instructor, Islamic Azad University, Miyaneh Branch, Miyaneh, Iran
*shahryarakbarinia@yahoo.com

ABSTRACT
In this work the possibility of synthesis of nano crystalline NiTi intermetallic, directly by mechanical alloying (MA) or by crystallization of amorphous phase formed during MA, were investigated. MA process and subsequent heat treatments were performed for two types of elemental nickel and titanium powders. MA process was performed in a planetary ball mill under an argon atmosphere for 50h. The powders morphology, phase formation and amorphization were investigated by X-Ray diffraction, differential scanning calorimetry and scanning electron microscopy. It is revealed that the shape memory NiTi intermetallic with nanometric size is the only component formed after crystallization of amorphous phase obtained by MA, and there was no any other undesirable component in the specimen structure.

KEYWORD:
Nitinol, Mechanical Alloying, Nanostructured NiTi, Amorphous Phase