PONDICHERRY UNIVERSITY

School of Physical, Chemical & Applied Sciences

Department of Physics

Invited Lecture

On

Magnetic field induced transition in Ferromagnetic Shape Memory Alloys

By

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Time: 2.30 PM
Venue: Raman seminar Hall, Dept. of Physics.

All are invited

Head of the Department of Physics

Magnetic field induced transition in Ferromagnetic Shape Memory Alloys

Abstract

Ferromagnetic shape memory alloys (FSMAs) with general formula $Ni_{50}Mn_{50-y}X_y$ (X=In, Sn and Sb) belong to the class of magnetic materials having interesting functional behavior associated with the application of magnetic field. The functional performance of FSMAs as transducers, actuators and switching devices is associated with the first order structural transition known as martensitic transition (MT). In these alloys the high temperature phase is a ferromagnetic austenite phase while the low temperature phase is low magnetization martensite phase, which could be either ferromagnetic or antiferromagnetic in nature. This magnetostructural transition is very sensitive to the field, pressure and composition, which makes them a good candidate for multifunctional applications.

In these alloys, the first order martensite transition is influenced by disorder which gives rise to the coexisting austenite and martensite metastable states. Metastability associated with phase co-existence in a system is an interesting feature which introduces the possibility of tuning a particular phase fraction with the application of external parameters like temperature and field. This understanding is important in the development of first order phase transition materials towards the aim of practical applications because the path following in the HT space plays an important role in deciding the final state of the system.

Some compositions of FSMAs like $Ni_{50}Mn_{35}In_{15}$ and $Ni_{50}Mn_{35}Sn_{15}$ and their cobalt derivatives show interesting behavior like field induced arrested kinetics giving rise to the co-exiting phases. In this talk interesting magnetization results on some of these materials will be highlighted.