

# Magnetostructural map of the $(\text{Mn,Fe})_3(\text{Si,P})$ System

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## Introduction and Motivation:

In the context of magnetocaloric applications some attention has been paid to the use of transition metal alloys as a possible cheap and non-toxic material alternative.

The current work is a study of the  $(\text{Mn,Fe})_3(\text{Si,P})$  system, aiming at exploring its magnetic and structural characteristics for possible magnetic cooling applications. However, relevant phase transition observed in this system present the characteristics of a 2<sup>nd</sup> phase transitions; therefore, their associated magnetocaloric effect is rather low. But still, such study enabled us to construct the magnetostructural phase diagram of this system.

## Brief Description:

The whole  $(\text{Mn,Fe})_3(\text{Si,P})$  system presents Antiferromagnetic behavior for  $\text{Fe} \leq 1.2$ , above this concentration a Ferro-Paramagnetic transition is observed. In the Cubic phase the temperature of this transition is proportional to the Fe content. This phase also presents an Antiferro-Ferromagnetic transition at around 50 K for  $1.2 \leq \text{Fe} \leq 2.3$ .

In the newly discovered Hexagonal phase, the transition appears indifferent to composition changes. Samples belonging to the Orthorhombic phase on the P rich side ( $1 \leq \text{Fe} \leq 2.2$ ) appear to always be Antiferromagnetic and a Ferro-Paramagnetic transition is only observable in the Tetragonal phase, for  $\text{Fe} \geq 2.2$ .

## References:

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