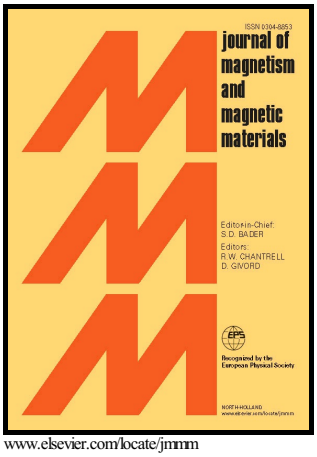

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Magnetic phase diagrams in the *H-T* plane of the magnetically strongest sigma-phase Fe-V compounds

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Magnetization measurements were performed on two sigma-phase samples of $Fe_{100-x}V_x$ (x=35.5, 34.1) vs. temperature, T, and in DC magnetic field, of various amplitudes. Using three characteristic temperatures, magnetic phase diagrams in the H-T plane have been designed testifying to a re-entrant character of magnetism. The ground magnetic state, a spin glass (SG), was evidenced to be composed of two sub phases: one with a weak irreversibility and the other with a strong irreversibility. Two critical lines were reconstructed within the SG state. Both of them show a crossover from the Gabay-Toulouse behavior (low field) to a linear and/or quasi-Almeida-Touless behavior. A strong difference in the effect of the applied magnetic field on the SG phase in the two samples was revealed.

Key words: Fe-V alloys; Sigma phase; Re-entrant magnetism; H-T phase diagram

1. Introduction

An interest in spin-glasses (SGs) had is apogee some 3-4 decades ago. Despite a huge number of papers have been published – for a review see [1-4] – a full understanding of the SGs and their behavior(s) has not been achieved yet. One of the main reasons for this situation follows, in our opinion, from the fact that phenomena originally observed in systems defined as SG (recently known rather as canonical SGs, C-SGs) were also revealed in systems that cannot be classified as the C-SGs because a concentration of magnetic atoms in these systems is significantly higher than the so-called percolation limit (the systems are termed as concentrated or cluster SGs). Concerning the latter, as the only criterion for the C-SGs, one usually considers a chemical content of the magnetic entities. Whereas, the magnetic interactions i.e. their strength and range seem to be even more important factors