Letter to the Editor

MAGNETIC PHASE DIAGRAM OF THE SYSTEM Y $(Fe_xAl_{1-x})_2$[1])

ДИАГРАММА МАГНИТНОГО СОСТОЯНИЯ СИСТЕМЫ Y $(Fe_xAl_{1-x})_2$

V. SECHOVSKÝ[2]), P. NOZAR[2], Praha

The recent investigation of $Y(Fe_xAl_{1-x})_2$ has revealed freezing phenomena in the Fe-rich concentration range $x = 0.65 \div 1.0$ [1]. The Al-rich compounds were reported to be paramagnetic down to LN temperatures, however, with paramagnetic Curie temperatures about 100 K [1]. The high values of Θ_p were attributed to intracluster interactions within Fe clusters.

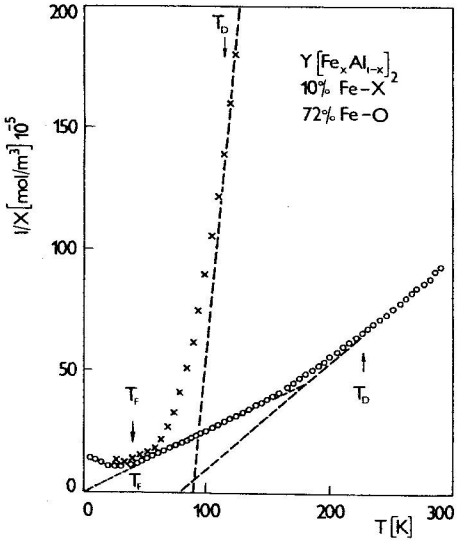

Fig. 1. The inverse susceptibility vs temperature for $x = 0.1$ (×) and 0.72 (○).

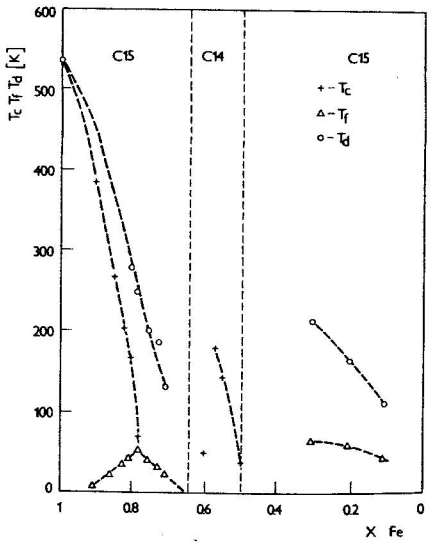

Fig. 2. The magnetic phase diagram completed by the concentration dependence of T_D and T_F.

[1]) Contribution presented at the 7th Conference on Magnetism, KOŠICE, June 5—8, 1984.

[2]) Matematicko fyzikální fakulta Univ. Karlovy, Ke Karlovu 5, 120 00 PRAHA 2, Czechoslovakia.

The aim of the present paper is to report the results of an extended investigation of low field magnetization of the system down to 5 K. The measurements were performed by means of the Faraday method using a Sartorius 4102 microbalance and a continuous gasflow cryostat [2]. The range of applied fields was $0 \div 0.5$ T.

The results performed on Al-rich compounds have revealed cluster-glass behaviour characterized by broad maxima in the temperature dependence of magnetization and the typical differences between FC and ZFC curves for $0.4 > x > 0$.

The typical temperature dependences of the inverse magnetic susceptibility are given in Fig. 1 for representative concentrations of both the Fe-rich and Al-rich regions separated by the two characteristic temperatures T_D and T_F. The behaviour above T_D can be ascribed to the Curie-Weiss type, while the systematic deviation from the C-W law is indicated below T_D (the linear dependence resembling the Curie law between T_D and T_F for high Fe concentrations whereas the shape is substantially curved for the diluted Fe part). A characteristic upturn connected with freezing is seen below T_F.

The deviation below T_D can be attributed to the intracluster ordering of magnetic moments of Fe [3]. The different shape of the intermediate part between T_D and T_F for Fe-rich and Fe-diluted concentrations can be explained due to the different origin of cluster anisotropy in these concentration regions. While the intercluster interactions are believed to be a source of cluster anisotropy in high Fe concentrations, the cluster shape anisotropy only is supposed for lower Fe concentrations.

The magnetic phase diagram of the system is presented in Fig. 2.

REFERENCES

[1] Hilscher, G., Grossinger, R., Sechovský, V., Nozar, P.: J. Phys. F: Met. Phys. *12* (1982), 1209.
[2] Sechovský, V.: to be published.
[3] Nozar, P., Sechovský, V.: in this Conference.

Received November 22nd, 1984