CRYSTALLINE AND MAGNETIC PROPERTIES OF Fe-Mn-Ge INTERMETALLIC COMPOUNDS

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The crystalline and magnetic properties of the intermetallic system $Fe_{5-x}Mn_xGe_3$ were investigated in [1,2] for $0<x<2$, and $x=3.5$, 4.0, 4.5 . It was found that both end members of that series are ferromagnetic. The crystal structure of Fe_5Ge_3 is of the $B8_2$ type while Mn_5Ge_3 has the $D8_8$ structure [3] .

In this contribution we present the results of the X-ray, neutron diffraction, magnetometric and Mössbauer effect investigations for the compounds with $x=1.0$, 2.0, 3.0, 4.0 .

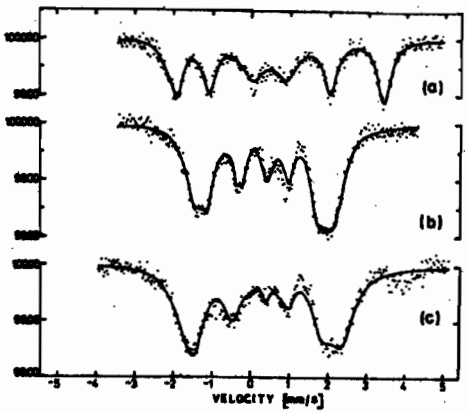
The X-ray diffraction measurements showed that the crystal structure of the compounds with $x=1.0$ and 2.0 is of the $B8_2$ type, the compound with $x=3.0$ is two phased /diffraction peaks from $B8_2$ and $D8_8$ structures were observed/, and the compound with $x=4.0$ has the $D8_8$ structure.

The magnetometric investigations confirmed that all investigated compounds are ferromagnetic. The determined Curie temperatures decrease with an increase of x.

From the neutron diffraction data the magnetic moments of Fe and Mn atoms were determined, collinear ordering of those moments was confirmed and the following distributions of Fe, Mn and Ge atoms in sublattices was established:

	2/a/	2/d/	2/c/
x=1	0.28 Mn + 0.72 Fe	0.05 Mn + 0.62 Fe	1 Ge
x=2	0.67 Mn + 0.33 Fe	0.67 Fe	1 Ge
	4/d/	6/g/z_1	6/g/z_2
x=4	1.22 Mn + 0.78 Fe	2.78 Mn + 0.22 Fe	1 Ge

The Mössbauer effect measurements were performed at room and liquid nitrogen temperatures. The hyperfine fields and the distribution of Fe atoms in two non-equivalent crystallographic sites were determined. Except for Fe_4MnGe_3 a good agreement with neutron diffraction data was found for the distribution of Fe atoms.



The Mössbauer spectra obtained at 78 K for:

a/ $FeMn_4Ge_3$
b/ $Fe_3Mn_2Ge_3$
c/ Fe_4MnGe_3

The detailed discussion of the obtained results is included in [4] .

References:

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2. W. Reiff, K. Narasimhan, H. Steinfink, J. Solid Chem. 4 /1972/,38
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