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and Co occupancy. The average hyperfine field values of $Nd_3(Fe_{1-x}Co_x)_{27.7}Ti_{1.3}$ depend on the Co content in a similar way to the dependence of the saturation magnetisation, increasing with the Co content up to x = 0.3 and then decreases for x = 0.4. Analogous behaviour was observed for R = Dy, Tb.

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Magnetic Phase Transition of Fe_2MnSi

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The ternary compound Fe_2MnSi has a crystal structure of a Heusler type($L2_1$-type). Between 69 and 214 K Fe_2MnSi is ferromagnetic but below 69 K the manganese atoms become antiferromagnetically ordered whilst the iron atoms remained ferromagnetically aligned.[1]) The very large step-like anomaly was observed at 69 K for the specific heat measurement.[2])
To investigate the properties of the magnetic phase transition at 69 K for Fe_2MnSi, Mössbauer and high field magnetization measurements are carried out for Fe_2MnSi. The sample was prepared by melting the high purity constituent elements in an argon arc furnace. Mössbauer spectra were recorded in a transmission using a constant acceleration spectrometer with a ^{57}Co(Rh) source. The Mössbauer spectrum obtained at room temperatute shows a single absorption line.The Mössbauer spectra, taken at 4.2 K and 77 K, are very similar. These spectra can be fitted by two site model with intensity ratio (site(B,D)/site C) of 100/15. The hyperfine fields at the site (B,D) and the site C are 60 ± 3 kOe and 107 ± 5 kOe, respectively. The appearence of the spectrum from the site C implies that there is a small interchange of Fe and Mn atoms in the (B,D) and C sublattices. The magnetic phase transition of Fe_2MnSi is discussed by using a molecular field theory on the basis of the localized model.

[1] K.R.A.Ziebeck and P.J. Webster, Philos. Mag. 34(1976) 973
[2] B.Dennis et al., private communication

T3/29

About Magnetic Properties of Thin Surface Layer of Ferromagnetic in Weak Magnetic Fields

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It is known [1] that a tangential incidence of resonant gamma-beam on a surface of sample under CEMS measurements allow to selectively investigate structural and magnetic anisotropy of thin surface layers of magnetic materials. In a special supposition, that magnetization of surface can be described by a vector of magnetization lying at the plane of surface, the CEMS measurements directly allow to estimate a value and direction of this vector [2].
In the present contribution we measured a magnetization curve of a layer 0.1 mm of polycrystal ferromagnetic sample at weak magnetic fields (< 10 Gs) by means of CEMS. In our measurements we used a sample of a-Fe, enriched by 57Fe up to 97%. External magnetic field was applied in three mutually perpendicular directions. Two of them lied in the plane of the surface of sample (H, H÷÷), while the third one was applied in normal direction (HN). Beam incident angle was 0-10°. To estimate a magnetization we measured of a ratio of Zeeman lines intensities in the obtained Mössbauer spectra. We revealed non-producing results of measurements of the curve of magnetization in different measuring cycles. It prompted us to propose an existence of slow spontaneous fluctuations of magnetization vector in thin surface layer of the sample.
In order to check this supposition we changed a scheme of the experiment. For each fixed value and direction of external field H we measured 500 Mossbauer spectra during 80 s per each spectrum. For each such spectrum we calculated the parameters , where Si, are the squares of Zeeman lines. Then, according to the results of 500 measurements, we plotted an experimental histogram of probability density for the parameter x, which is the most sensitive to magnetic anisotropy. For each experimental histogram we determined the average value of x and the width sxý. In all cycles of measurements the obtained value of sxý exceeded sxT, where sxT is the width being calculated theoretically. Under H, H÷÷ ^{3} 5 Gs the value sxý^{3}2sxT; under applying of HN sxý≫1.3sxT. These results can be explained by a single supposition: there are spontaneous slow fluctuations of magnetization vector in a thin surface layer 0.1 mm of polycrystal ferromagnetic, and these fluctuations depend on the value and direction of the external magnetic field. The fluctuations take place under H=0, too.
Some additional experiments, confirming this supposition, are discussed.

[1] A.L. Kholmetskii et al., Nucl. Instrum. & Meth. B129, 110, 1997
[2] V.L. Gurachevskii et al., Doklady AN BSSR, 29, 917, 1985

T3/30

Crystallization and Anisotropic Hyperfine Field Fluctuation in Double Perovskite A_2FeMoO_6 (A=Ba,Sr,Ca)

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The double perovskite oxides A_2FeMoO_6 (A=Ba, Sr, Ca) have been studied by Mössbauer technique, neutron and x-ray diffraction. The single phases of the polycrystalline A_2FeMoO_6 powders have been prepared by a solid-state reaction method. Crystal structures are cubic for A=Ba, tetragonal for A=Sr, and monoclinic for A=Ca, respectively. In Sr_2FeMoO_6, the unit-cell parameters increase linearly with increasing the temperature, and the crystal symmetry changes into cubic in the paramagnetic phase (above T_C). Mö ssbauer spectra measurements of the A_2FeMoO_6 powder samples have been taken at various temperatures ranging from 18 to 450 K. The Curie temperatures are 345 K for Ba_2FeMoO_6, 425 K for Sr_2FeMoO_6, and 350 K for Ca_2FeMoO_6, respectively. As the temperature increase toward to the Curie temperature, Mö ssbauer spectra show the line broadening and 1, 6 and 3, 4 linewidth difference because of anisotropic hyperfine field fluctuation. In Sr_2FeMoO_6, the anisotropic field fluctuation of +H (P_+=0.85) was great than -H(P_-=0.15). We also calculated frequency factor and anisotropy energy with values of 9.8 $\Gamma/\hbar$ and 149.6 erg/cm^3 for Sr_2FeMoO_6, respectively, using the relatively accurate data for T=260 K which is associated with the large line broadening. The anisotropy energys increase with decreasing ions radius of A-site atom(Ba, Sr, Ca).

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Mössbauer Study and Electron Transport Properties in $Co_{0.1}Fe_{0.9}Cr_2S_4$

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Sample of $Co_{0.1}Fe_{0.9}Cr_2S_4$ has been studied with Mössbauer spectroscopy, x-ray diffraction, SQUID magnetometer, and magnetoresistance (MR) measurements. The crystal