MAGNETISM OF DISORDERED NANOMATERIALS

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One way of preparing new amorphous materials with no detectable (or less) metalloid content is to grow artificially layered structure of amorphous Fe-Co-B and Fe multilayers. This permit a high degree of control of both structure and magnetic properties. Interdiffusion of Fe Layers in amorphous FeCoB and FeCoB in Fe causes the formation of a material with new properties. In this paper the progress concerning the amorphous Co-Fe/Fe^{57} Multilayers with Fe thickness in the range of 1- 10 Monolayer will be reported. Our results indicate a strong dependence of the local moment, Fermi contact field and isomer shift for Fe atoms as a function of the thickness of Fe layers. The magnetic hyperfine field of Fe in crystalline Fe/Co multilayer samples
decreases with increasing layer thickness. Comparing the results of the crystalline Fe/Co and the amorphous Co-Fe/Fe^{57} Multilayers we will show that in opposite to the crystalline Fe/Co multilayers the magnetic hyperfine fields in amorphous Co-Fe/Fe multilayers increases with increasing layer thickness.

The enhancement of the magnetic hyperfine fields as a function of layer thickness is strongly related the electronic density on Fe nucleus. The Fe layers with thicknesses up to 5 Monolayer have an amorphous structure. The mean magnetic hyperfine field of amorphous layers are extremely enhanced. The mean hyperfine field of multilayers with thickness of 3 and 4 layers is even more than bcc Fe. The reason for the increase of the magnetic hyperfine fields in these samples will be discussed in this paper.