MAGNETIC ANISOTROPY IN EuS-PbS MULTILAYERS

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9.7 cm

The EuS-PbS multilayers form semiconducting ferromagnet-diamagnet structures which are model low dimensional Heisenberg ferromagnets. The ferromagnetic transition is observed in the structures with EuS thickness d down to 2 monolayers (ML). For EuS thicknesses smaller than about 10ML, the Curie temperature decreases with decreasing EuS thickness, $\Delta T_c \sim -1/d$. The transition temperature also depends on stress present in the structures. We present the results of ferromagnetic resonance studies of the thickness dependence of magnetic anisotropy in 2 series of EuS-PbS multilayers grown on (111) BaF_2 and (100) KCl substrates with the EuS thickness varying in the range $d = 2 - 50$ML. The anisotropy constant K was found to follow the dependence $K(d) = K_v + K_s/d$, with the surface term K_s larger for layers grown on BaF_2 as compared to KCl. This difference is discussed in terms of different thermal stress-induced distortions of cubic crystal lattice of EuS. We found that the thickness of EuS layer required for the perpendicular (to the layer) magnetization is $d \leq 2$ Å, i.e., it is below 1ML.

13.4 cm

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