Magnetic properties of $SmMn_{12-x}Ni_x$ system

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9.7 cm

The $SmMn_{12-x}Ni_x$ alloys crystallize in the tetragonal, $ThMn_{12}$-type structure and they exist for the Ni concentration $4 \leq x \leq 8$. The magnetic susceptibility has been investigated at $T = 1.9$–300 K in magnetic field of 5 kOe using the SQUID magnetometer. At 4.2 K the magnetization has been measured in magnetic field up to 140 kOe on polycrystalline and finely powdered samples. The temperature dependence of the magnetic susceptibility χ exhibits for the samples with $x = 8$, 7, 5 and 4 a maximum at T_{N} (?) ~ 70 K, whereas the $\chi(T)$ plot for the $x = 6$ sample shows two maxima: at $T \sim 30$ K and very diffuse at $T \sim 180$ K. The field dependence of magnetization at low temperature is in principle linear. These results suggest that the maximum at about 70 K corresponds to the onset of an antiferromagnetic ordering of the Sm sublattice because it is not sensitive to the composition change. The double maxima for the $x = 6$ alloy seems to result from some crystallographic imperfection of the sample. As it was shown for the $RMn_{12-x}T_x$, where R — rare earth and T = Fe or Co, the magnetic ordering in these sublattices as well as in the Mn one is very sensitive to mutual relation of T and Mn concentration. In the present system both the Mn and Ni sublattices seem to be nonmagnetic.

13.4 cm

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