GIANT MAGNETORESISTANCE IN THE REGION OF THE MAGNETIC PHASE TRANSITION IN $Gd_{0.5}La_{0.5}MnSi$ COMPOUND

S.A. Nikitin, I.A. Tskhadadze, L.A. Skipetrova, V.A. Andronova
Department of Physics, Moscow State University, 119899 Moscow, Russian Federation

9.7 cm

$Gd_{0.5}La_{0.5}MnSi$ compound has been studied by magnetization, resistivity, and magnetoresistance measurements. As previously shown[1] in $Gd_xLa_{1-x}MnSi$ series the substitution of Gd by La leads to a change of the magnetic structure from ferromagnetic (FM) type for $GdMnSi$ to antiferromagnetic (AFM) type for LaMnSi. The temperature induced metamagnetic phase transition $AFM \rightarrow FM$ takes place for $Gd_{0.5}La_{0.5}MnSi$ at $T \simeq 100K$.

In the magnetically ordered region the magnetoresistance is negative, and the temperature dependence of magnetoresistance $\Delta R/R(T)$ is characterized by a sharp minimum at $T \simeq 103K$. The maximaum value of $\Delta R/R$ effect exceeds 3% at external magnetic field $14kOe$. The absence of the saturation on $\Delta R/R(H)$ curves results from the essentially higher values of the maximaum $\Delta R/R$ effect in these compounds. The obtained results can be explained by the strong change of magnetic contribution to the conductivity due to the destruction of the layered antiferromagnetic structure.

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[1] S.A. Nikitin, O.B. Nekrasova, T.I. Ivanova, Yu.F .Popov, R.S. Torchinova. Phys. Solid State (in Russian) 33(6) (1991) 1640.

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Corresponding author :
I.A.Tskhadadze

Address for correspondence :
Department of Physics, Moscow State University,
119899 Moscow,
Vorobievy Gory
Russia

Email address :
ioulia@rem.phys.msu.su