Phase transitions induced by high pulsed magnetic fields up to 500 kOe

Kamantsev A P[1,@], Koshkidko Yu S[1,3], Gamzatov A G[2], Shavrov V G[1] and Koledov V V[1]

[1] Kotelnikov Institute of Radioengineering and Electronics of the Russian Academy of Sciences, Mokhovaya 11-7, Moscow 125009, Russia
[2] Amirkhanov Institute of Physics at the Dagestan Federal Research Center of the Russian Academy of Sciences, M. Yaragskogo 94, Makhachkala, Dagestan 367015, Russia
[3] Institute of Low Temperature and Structure Research of the Polish Academy of Sciences, Okolna 2, Wroclaw 50-422, Poland

[@] kaman4@gmail.com

Interest in the investigation of magnetic materials with phase transitions (PTs) of the first order is associated not only with the observed strong relationship between the magnetic, structural, and electronic subsystems, but also with the possibilities of practical application of the effects arising from these interactions. The most promising examples of such phenomena include the colossal magnetoresistance effect and the giant magnetocaloric effect (MCE) [1]. MCE measurements in high pulsed magnetic fields up to 500 kOe using microthermocouples (with wire thickness of 25 μm) of type T (copper-constantan) were carried out at the Laboratory of High Magnetic Fields in the Helmholtz Center Dresden-Rossendorf, Dresden, Germany. This measurement technique was described in [2]. The investigations in high pulsed magnetic fields were carried out on samples of alloys with the first order magnetostructural PTs (composite material based on MnAs, Heusler alloys $Ni_2Mn_{0.74}Cu_{0.26}Ga$, $Ni_{47}Mn_{40}Sn_{12.5}Cu_{0.5}$), and an alloy with metamagnetic isostructural PT ($Fe_{49}Rh_{51}$). The PTs were induced from a weakly magnetic to a strongly magnetic phase in all of these materials.

This work was supported by the Russian Science Foundation (project No. 20-19-00745).

[1] Lyubina J 2017 *J. Phys. D: Appl. Phys.* **50** 053002
[2] Ghorbani Zavareh M 2015 *Appl. Phys. Lett.* **106** 071904