

Kinetic and Relaxation Processes in Vicinity of Phase Transition in Prospective Magnetocaloric Materials

A. Kamantsev,¹ V. Koledov,¹ V. Shavrov,¹ and I. Tershina²

¹*Kotelnikov IRE RAS, Moscow 125009, Russia*

²*Lomonosov Moscow State University, Moscow 119991, Russia*

The problem of rate of phase transitions (PTs) requires an indispensable solution, because the creation of new technologies based on “giant” effects in vicinity of PTs in magnetic materials is impossible without solving of this problem. The rate of PT limits the frequency of thermodynamic cycles. We present a new technique for experimental study of the kinetics of the magnetic PTs under low alternating magnetic field. The new dynamic thermo-magnetometer (DTM) is proposed for solving the problem of the rate of the magnetic PT with response time of 10 ms. DTM is designed for measuring the time dependence of the magnetic susceptibility of thin plates of ferromagnets at an abrupt temperature change in water flow. As a result of experiments for Gd near $T_c = 20$ C relaxation time of magnetization is 50 ms (1). Recently DTM was developed for working on materials with the first order PTs. The last experiments shown big difference at heating and cooling in relaxation time in Ni-Mn-Ga(Fe) Heusler alloys. This difference may achieves hundreds of milliseconds.

References:

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