Nanooptic and nanophotonic

Optical-induced remagnetization effects in rare-earth transition based tunnel magnetic nanostructures

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Physical limits of the minimal remagnetization time and minimal sizes of a remagnetization media represent one of fundamental problems of the physics of magnetism, which has a crucial significance for realization of ultrafast and ultra-density recording and readout of information [1]. The solution of this problem associates with the laser impact on the ferrimagnetic multilayered nanostructures.

The laser-induced remagnetization of a ferrimagnetic nanolayer under femtosecond pulsed laser radiation is characterized by its initial laser-induced swift heating, thermal demagnetization with different speeds of ferrimagnetic sublattices with subsequent a magnetic bias that can be caused both laser-induced electron excitations and nonequilibrium transitional ferromagnetic-like magnetic states combined with exchange interaction relaxation [2,3].

Features of the laser-induced remagnetization and magnetoresistance effects in magnetic tunnel nanostructures based of the rare-earth transition amorphous ferrimagnetic compounds TbCoFe with controlled strong enough magnetic anisotropy have investigated. The role of the laser-induced effective internal magnetic fields related to the magneto-optical inverse Faraday effect, a spin torque transform effect and the laser-injection spin nonequilibrium redistribution in the magnetization reverse has studied. It was demonstrated, that these effects can be used for creating TbCoFe-based multilayered tunnel magnetic nanostructures with ultrafast and high-density information recording.

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2. *Ostler T.A., Barker J., Evans R.F.L., at al.,* Ultrafst heating as a sufficient stimulus for magnetization reversal in ferrimagnet // Nature Com.-2012.- N 3.-P. 1-6.
3. *Baryakhtar V. G., Butrin V.I., Ivanov B. A.* Exchange relaxation as a source of an ultrafast reorientation in ferrimagnetics //JETP Lett.2013.-**98.-**P**.** 327.