Slow relaxation of anomalous Hall effect in GdFeCo/Ir/GdFeCo

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Heterostructures GdFeCo/Ir/GdFeCo with two ferromagnetic layers manifest spin-orbit torque (SOT). These samples are synthetic ferrimagnets (SF) with perpendicular magnetic anisotropy. Angular dependence of resistance allowed us to decompose resistance to classic, planar and spin-Hall components. We have analyzed possibility of magnetization reversal caused by spin polarized electron current. SOT-MRAM logic elements are basis for energy saving magnetoresistive memory [1]. Fig. 1 a shows dependences of electrical resistance corresponding to the anomalous Hall effect (AHE) on the magnetic field at the same "in-plane" orientation of magnetic field. Solid line is field dependence of the in-plane hysteresis of resistivity *R* in initial sample, while dashed line is the in-plane field dependence *R(H)* in the sample preliminary magnetized in perpendicular orientation and turned to in-plane configuration.

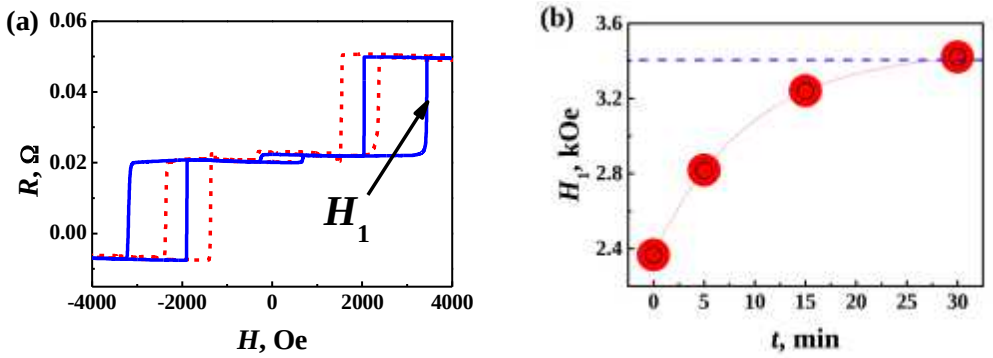

Figure 1. Dependence of electrical resistance on the magnetic field (a) In the sample not magnetized before resistance recording (solid line), (b) In the sample perpendicularly magnetized in magnetic field 1 T and rapidly turned into the in-plane orientation. Solid line is exponential approximation.

Slow (~30 min) relaxation of coercive field determined from *R*(*H*) dependence is observed upon reorientation of the GdFeCo/Ir/GdFeCo two-layer structure in a magnetic field after saturation of the sample by 1 T (Fig. 1 b).

We acknowledge funding from the Ministry of Science and Higher Education of the Russian Federation (Grant No. 075-15-2020-779).

[1] Q. Shao, P. Li et. al., *IEEE Trans. Magn.* **2021**, *57*.