# Exchange bias in a spintronic THz emitter structure based on IrMn/Co

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Exchange bias is commonly used to establish a reference direction of magnetization in magnetic structures. This method has been applied in thermally assisted MRAM (magnetoresistive random-access memory) cells, combining ferromagnetic and antiferromagnetic layers with exchange bias. This approach enhances the thermal stability of the storage layer and increases writing density. In these cells, writing is only possible when heated above the blocking temperature of the antiferromagnetic layer and under the influence of a magnetic field, thereby improving the stability of this memory type. The study aimed to demonstrate the controllability of exchange bias and determine the bias field in ferromagnetic–antiferromagnetic structures. To achieve this, an IrMn/Co structure was manufactured on a sapphire substrate using the magnetron sputtering method. Recording the magnetic state in an external magnetic field involved locally heating the antiferromagnetic layer with femtosecond laser pulses, totaling approximately 10 000 pulses, and a laser power density of 2.1 mJ/cm. A magnetic field with an intensity of about 100 Oe was applied in the sample plane. Applying a magnetic field of approximately 20 Oe in opposite directions demonstrated the switching of the magnetization state in the investigated structure through heating with ultrafast laser pulses. The study revealed the existence of four stable magnetization states characterized by the shift of the THz hysteresis loop, with a bias field determined to be 28 Oe. The work is supported by the Ministry of Science and Higher Education of the Russian Federation (project No. 075-15-2022-1131).