Magnetic control of anomalous hall effect induced by spin chirality

June 29 2011, By Mikiko Tanifuji

Institute for Solid State Physics, the University of Tokyo and RIKEN announced that researchers from both institutes succeeded in the magnetic control of anomalous Hall effect (AHE) induced by spin chirality. Details were published in *Physical Review Letters.*

Since spin chirality (solid angle formed by spin) is accompanied with a strong virtual magnetic field, AHE is observed without applying field. Such large Hall voltages under weak magnetic fields may lead to a promising nonvolatile memory with reduced power dissipation because of the absence of hysteresis loss.

In the present work, AHE of the chiral spin states of Pr2Ir2O7 was found to appear below 1.5 K at a zero magnetic field with hysteresis most pronounced for fields cycled along the [111] direction. A large positive magnetoresisitance was also observed only for fields along the [111] direction. These observa-tions suggest the reconstruction of the electronic structure of the conduction electrons by the field-induced spin texture.

The present results, the authors of the paper expect, may provide a mean to control magnetically the AHE induced by spin chirality, which might be a step toward nonvolatile memory based on the AHE.

More information: L. Balicas, et al, "Anisotropic Hysteretic Hall Effect and Magnetic Control of Chiral Domains in the Chiral Spin States of Pr2Ir2O7", *Physical Review Letters*, Vol. 106, No. 21, p. 217204

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