Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Disentangling the physical contributions to the anomalous Hall effect and domain wall resistance in isoelectronic $L1_0$-FePd and $L1_0$-FePt alloys KLAUS SEEMANN, FELIPE GARCIA-SANCHEZ, ATTILA KAKAY, CLAUS SCHNEIDER, Peter Gruenberg Institut, Research Centre Juelich, Germany, FRANK FREIMUTH, YURIY MOKROUSOV, STEFAN BLUEGEL, Institute for Advanced Simulation, Research Centre Juelich, Germany, RICCARDO HERTEL, Institut de Physique et Chimie des Materiaux de Strasbourg, Universite de Strasbourg, CNRS UMR 7504, Strasbourg, France — We analyze the origin of the electrical resistance arising in domain walls of perpendicularly magnetized materials by considering a superposition of anisotropic magnetoresistance and the resistance implied by the magnetization chirality. The domain wall profiles of $L1_0$-FePd and $L1_0$-FePt are determined by micromagnetic simulations based on which we perform first principles calculations to quantify electron transport through the core and closure region of the walls. The wall resistance, being twice as high in $L1_0$-FePd than in $L1_0$-FePt, is found to be clearly dominated in both cases by a high gradient of magnetization rotation, and not by the spin-orbit interaction driven anisotropic magnetoresistance effect. Concerning the anomalous Hall effect on the other hand, we show that difference in spin-orbit interaction strength of Pt and Pd atoms leads to a pronounced cross-over from an extrinsic side jump mechanism in $L1_0$-FePd to an intrinsic Berry-phase anomalous Hall effect in $L1_0$-FePt.

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Date submitted: 25 Nov 2011 Electronic form version 1.4