Abstract Submitted
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Spin-Dependent Smoluchowski effect OLEG STEPANYUK, Faculty of Physics, Moscow State University, Moscow, Russia(1), MARCO CORBETTA, Max-Planck-Institut für Mikrostrukturphysik, Halle (Saale), Germany(2), OLEG POLYAKOV, (1), HIROFUMI OKA, (2), ALEXANDER SALETSKY, (1), DIRK SANDER, VALERI STEPANYUK, JÜRGEN KIRSCHNER, (2) — Surface defects, such as steps, nanoclusters, stripes or wires can significantly perturb the electronic structure of a surface. More than 70 years ago, Smoluchowski showed that electrons will not follow the sharp discontinuity of an atomic structure at step edges, instead, redistribution or "smoothing" of the electron cloud at surface protrusions should occur [1]. A charge redistribution process involves charge flow from the top of the step to the bottom and results in formation of local dipoles that are antiparallel to the surface dipoles of flat surfaces. We present a combined ab initio and experimental study of spin-dependent effects at the edges of magnetic nanoislands. Our results give clear evidence of the existence of a spin-dependent Smoluchowski effect which leads to spin, spatial and energy dependent charge flow at surface corrugations. Striking changes in the spin-polarization at the edge of Co islands on Cu(111) are predicted by calculations and revealed by the spin-polarized STS. We concentrate on a single Co nanoislands on Cu(111)[2]. Our results demonstrate that the spin-dependent Smoluchowski effect can strongly influence the tunneling magnetoresistance at the edges of magnetic nanostructures on metal surfaces.

[1] R. Smoluchowski, Phy. Rev. 60, 661 (1941)
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