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Ferromagnetic thickness dependence of exchange bias: breaking of the inverse proportionality law[1] RAFAEL MORALES, Dept. Chemical-Physics & BCMaterials, UPV/EHU and IKERBASQUE Basque Foundation for Science, Bilbao, Spain, ALI C. BASARAN, Dept. of Physics and Center for Advanced Nanoscience, University of California San Diego, La Jolla, USA, J.E. VILLEGAS, Unité Mixte de Physique CNRS/Thales, Université Paris Sud, Orsay, France, D. NAVAS, IFIMUP-IN and Dept. Física e Astronomia, Universidade do Porto, Porto, Portugal, N. SORIANO, B. MORA, C. REDONDO, Dept. of Chemical-Physics, UPV/EHU, Leioa, Spain, X. BATLLE, Dept. de Física Fonamental and Institut de Nanociència i Nanotecnologia IN2UB, Universitat de Barcelona, Barcelona, Spain, IVAN K. SCHULLER, Dept. of Physics and Center for Advanced Nanoscience, University of California San Diego, La Jolla, USA — The exchange coupling between antiferromagnetic/ferromagnetic (AF/FM) materials shifts the hysteresis loop along the field axis by an amount known as exchange bias field. It is believed that the ferromagnetic thickness dependence of the exchange bias field follows an inverse proportionality law. This has experimentally and theoretically been confirmed for FM thicknesses below the FM domain wall width. In this work we demonstrate that this exchange bias dependence is broken for certain FM spin structures, even though in FM layers thinner than the FM domain wall width. We present experimental data of FeF_2/FeNi bilayers that deviate from the inverse proportionality law, as well as a theoretical calculation that accounts for the results.

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