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Tuning exchange bias in Ni/FeF_2 heterostructures using antidot arrays XAVIER BATLLE, M. KOVYLINA, A. LABARTA, Dept. Física Fonamental, Universitat de Barcelona, 08028 Barcelona, Catalonia, Spain, R. MORALES, Basque Foundation for Science, IKERBASQUE, 48011 Bilbao, Spain, J.E. VILLEGAS, CNRS/Thales, Université Paris Sud, 91405 Orsay, France, M. EREKHINSKY, IVAN K. SCHULLER, Physics Department, University of California San Diego, La Jolla 92093 CA, USA — The transition from positive to negative exchange bias can be systematically tuned with antidot arrays artificially introduced into Ni/FeF_2 ferromagnetic (FM)/antiferromagnetic (AF) heterostructures. This is a consequence of the energy balance between the Zeeman coupling of the AF spins to the cooling field, and the AF exchange coupling at the FM/AF interface. The nanostructure plays a key role in the formation of pinned uncompensated spins in the AF: the antidot carving produces regions of locally pinned uncompensated spins throughout the antidot faces of the FeF_2 and these *non* interfacial magnetic moments favor the onset of positive exchange bias at lower cooling fields, by increasing the Zeeman energy of AF domains and favoring the alignment with the latter. Those *non* interfacial AF spins, and the pinned uncompensated interfacial AF spins responsible for the exchange bias (loop shift), align simultaneously with the cooling field since they belong to the same AF domain and become pinned below the Néel temperature.

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