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Temperature dependence of the training effect in exchange bias heterostructures CHRISTIAN BINEK, University of Nebraska-Lincoln, XI HE, SRINIVAS POLISETTY — Recently, the training of the exchange bias (EB) effect in antiferromagnetic (AF)/ferromagnetic (FM) heterostructures has been considered in the framework of activated spin configurational relaxation [1]. The EB field, $\mu_0 H_e$, is determined from hysteresis loops of the magnetization which are measured by SQUID-magnetometry after field-cooling the sample below the Néel temperature of the pinning layer. The evolution of $\mu_0 H_e$ in terms of the number of consecutively cycled loops is derived from a discretized Landau-Khalatnikov (LK) equation. Here the time parameter is replaced by the loop index n. Mapping the LK equation onto an implicit sequence allows to describe the training effect, $\mu_0 H_e$ vs. n for all n $\geq$1, of various EB heterostructures. In the limit n>1, our sequence approaches the empirical $\mu_0 H_e(n) \propto 1/\sqrt{n}$ behavior. The best fit of the sequence to a data set $\mu_0 H_e$ vs. n provides the essential fitting parameter γ which combines properties of the free energy and the damping with the exchange coupling at the AF/FM interface. We study γ vs. T by analyzing the T-dependence of the training effect in a CoO/Co bilayer. Various data sets of $\mu_0 H_e$ vs. n are determined from hysteresis loops after in-plane field-cooling at $\mu_0 H$=0.3T from T=320K to temperatures 5K<T<T_B $\approx$150K, respectively. γ vs. T increases with increasing temperature which provides insight into the T-dependence of the free energy. [1] Ch. Binek, Phys. Rev. B **70**, 014421 (2004).

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