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Coercivity of nanometer size Ni granular films as a function of temperature, grain size and dipolar interaction R. DAS, A.F. HEBARD, University of Florida, A. GUPTA, D. KUMAR, North Carolina A&T State University — The influence of temperature, grain size and dipolar interaction (DI) on coercive field H_c determined from hysteretic magnetization loops has been studied in nanometer size Ni granular films embedded in an insulating AlOx host matrix. Single layer (SL) and multilayer (ML) samples were grown using pulsed laser deposition by sequential deposition from AlOx and Ni targets. The Ni film thickness d, and hence the average grain size, is varied over the range of 3nm to 60nm. In the ML samples, the Ni layers are separated by 3nm-thick AlOx. At low temperatures $H_c(d)$ exhibits a peak at a crossover thickness d_x delineating *single domain* (SD) from *multi domain* (MD) behavior. The ML sample has a smaller d_x because of the increase in magneto static energy due to an increased DI associated with a greater number of nearest neighbors. In the SD region common to both samples, the H_c's are considerably higher for ML samples compared to those for SL samples. This effect can be understood in terms of collective dynamics of the interacting particles [1]. Surprisingly, $H_c(T)$ shows the well known Stoner-Wohlfarth square root temperature dependence in the MD region for both SL and ML samples. Even more surprising is the unexpected oscillatory dependence of $H_c(d)$ in the MD region for the SL samples. [1] C. Djurberg *et al.*, Phys. Rev. Lett. **79**, 5154 (1997).

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