Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Figures of Merit for Magnetic Recording Media RALPH SKOMSKI, D. J. SELLMYER, University of Nebraska, Dept. Phys. Astr. and NCMN — Since the first nucleation-field calculations for hard-soft nanostructures with multilayered [1] and arbitrary [2] geometries, exchange-spring magnets have attracted much attention in various areas of magnetism, including magnetic recording. Ultrahigh storage densities correspond to the strong-coupling limit, realized on small length scales and described by volume-averaged anisotropies. Second-order perturbation theory yields finite-size corrections that describe a partial decoupling of the phases. Since soft phases reduce the nucleation field, nanostructuring can be used to reduce the coercivity H_c while maintaining the energy barrier E_B. However, the ratio E_B/H_c is an ill-defined figure of merit, because the comparison with the Stoner-Wohlfarth model requires the introduction of a particle volume, as contrasted to an area. By using elongated particles with a continuous anisotropy gradient, it is possible to reduce the coercivity by a factor scaling as the bit size divided by the domain-wall width of the hard phase. However, with decreasing bit size this effect becomes less pronounced. In the strong-coupling limit, thermal stability yields a maximum storage density of order γ/k_BT, where γ is the domain-wall energy of the hard phase. - This research is supported by NSF MRSEC, INSIC, and NCMN. [1] S. Nieber and H. Kronmüller, phys. stat. sol. (b) **153**, 367 (1989). [2] R. Skomski and J. M. D. Coey, Phys. Rev. B **48**, 15812 (1993).

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Date submitted: 30 Nov 2006 Electronic form version 1.4