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Domain Properties of a Single Magnetic Nanorod Investigated by Cantilever Magnetometry SANGGAP LEE, ERIC MOORE, STEVEN A. HICKMAN, JOHN A. MAROHN, Cornell University — Single Ni nanorods having 50 to 100 nm diameter were integrated as the tip of ultra-sensitive cantilevers, having a force sensitivity of 8 aN/Hz$^{1/2}$ at 4.2 K, designed for use in scanned-probe magnetic resonace force microscopy. We measured cantilever frequency, dissipation, and frequency fluctuations as a function of magnetic field, applied along both the easy axis and the hard axis of the nanorods while the cantilevers were self-oscillated. The nanorods exhibit bulk magnetization. Hard-axis magnetometry experiments show the nanorods have $B_{switch} \sim 300$ mT, in which the magnetization switches from being orthogonal to being parallel to the applied field, and the three observables each show multiple sharp peaks. We find the cantilever frequency shift is well described by modeling the tip as a single-domain of uniformly-magnetized spins interacting with the applied field (the Stoner-Wohlfarth model).

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