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Experiments in Nuclear Magnetic Resonance Microscopy YONG LEE, WEI LU, J.-H. CHOI, Korea Research Institute of Standard and Science, H.J. CHIA, U.M. MIRSAIDOV, S. GUCHHAIT, A.D. CAMBOU, R. CARDENAS, K. PARK, J.T. MARKERT, University of Texas at Austin — We report our group's effort in the construction of an 8-T, ^{3}He cryostat based nuclear magnetic resonance force microscope (NMRFM). The probe has two independent 3-D of piezoelectric x-y-z positioners for precise positioning of a fiber optic interferometer and a sample/gradient-producing magnet with respect to a micro-cantilever. The piezoelectric positioners have a very uniform controllable step size with virtually no backlash. A novel RF tuning circuit board design is implemented which allows us to simply swap out one RF component board with another for experiments involving different nuclear species. We successfully fabricated and are characterizing $50\mu m \times 50\mu m \times 0.2\mu m$ double torsional oscillators. We have also been characterizing ultrasoft cantilevers whose spring constant is on the order of 10^{-4} N/m. We also report NMRFM data for ammonium dihydrogen phosphate(ADP) at room temperature using our 1.2-T system. Observed features include the correct shift of the NMR peak with carrier frequency, increases in signal amplitude with both RF field strength and frequency modulation amplitude, and signal oscillation (spin nutation) as a function of tipping RF pulse length. Experiments in progress on NH_4MgF_3 (at 1.2 T) and MgB_2 (at 8.1 T) will also be briefly reviewed. Robert A. Welch Foundation grant No.F-1191 and the National Science Foundation grant No. DMR-0210383.

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