Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

**Magnetic Resonance Force Microscopy and Force-Detected NMR of Microcrystals**[1] J. T. MARKERT, A. D. CAMBOU, J.-H. CHOI, S. GUCHHAIT, Y. J. LEE, W. LU, U. M. MIRSAIDOV, Department of Physics, University of Texas at Austin — We report our advances in nuclear magentic resonance force microscopy (NMRFM) and NMR of microcrystals using force (mechanical oscillator) detection. For each, we report microfabrication of sensitive single-crystal-silicon multiple-torsional micro-oscillators using both optical and e-beam lithography and a back-etch technique. We characterize mechanical oscillator frequency, quality factor, and spring constant from the noise spectral density of oscillator motion, detected using fiber-optic interferometry. We review past work on scanning-mode detection of the NMR response from volumes as small as 2 $\mu$m$^3$ at room temperature. We primarily discuss progress in two experiments currently underway: 1) the study of $^1$H dynamics in submicron-thick metal hydride films, where the NMRFM technique permits selective response to motion-modulated dipolar interactions with correlation times from microseconds to seconds, and 2) detection of the $^{11}$B resonance in microcrystals over the temperature range 4 K $< T <$ 300K. We also overview measurements made in our $^3$He low-temperature NMRFM system.

[1]This work was supported by ARO under DAAD-19-03-C-0071.

John Markert
Univ. of TExas at Austin

Date submitted: 01 Dec 2004 Electronic form version 1.4