

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Effect of Chamber Pressure on the Vibrational Properties of Micro- and Nano-Cantilevers** GAYATRI KESKAR, JAY GAILLARD, JONATHAN TAYLOR, MALCOLM SKOVE, APPARAO RAO, Clemson University — We have studied the nonlinear dynamics of micro- and nano-cantilevers under varying ambient conditions using the Harmonic Detection of Resonance technique (HDR)<sup>1</sup>. In our studies, a cantilever is either microstructure shaped like a diving board, or a cantilevered MWNT. In this work, we report the dependence of the amplitude and Q of a silicon microcantilever (300  $\mu\text{m}$  long, 35  $\mu\text{m}$  wide, 2  $\mu\text{m}$  thick) on ambient pressure. An environment of air at a pressure of  $10^{-3}$  Torr gives a high quality factor of  $\sim 7000$ . The response of higher harmonics of the ac voltage that drives the cantilever is also observed with varying chamber pressure. An investigation of the influence of ac and dc voltages on sensitivity shows very good agreement with a model calculation. The shift in the resonant frequency of cantilevers under different environments such as helium, air and argon at different pressures will be discussed. **References:** 1. J. Gaillard, M. J. Skove, R. Ciocan, and A. M. Rao, Rev. Sci. Instrum. 77, 073907 (2006). **Contact Info:** [arao@clemson.edu](mailto:arao@clemson.edu)

Gayatri Keskar  
Clemson University

Date submitted: 29 Nov 2006

Electronic form version 1.4