Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Photoacoustic Characterization of Nanoelectromechanical Systems A. KUMAR, O. BALOGUN, T. KOUH, KAMIL EKINCI, T.W. MURRAY, Aerospace and Mechanical Eng. Dept., Boston University — A photoacoustic microscopy system has been developed to study the nanomechanical properties of Nanoelectromechanical Systems (NEMS). In these experiments, the fundamental flexural resonances of doubly-clamped nanomechanical beams are excited photothermally and the resulting displacements are detected using optical interferometry. Our system uses an amplified electroabsorption modulated laser source, and allows excitation at frequencies up to 5 GHz. Femtometer scale displacements of NEMS are detectable using a path-stabilized Michelson interferometer and narrowband phase sensitive detection techniques. Our measurements have enabled the determination of resonance parameters such as resonance frequencies and mechanical quality (Q) factors, elastic constants and mode shapes. The results are compared to a theoretical model for photothermal excitation of doubly clamped beams. Our measurements indicate that photoacoustic microscopy is well suited for the nondestructive evaluation and opto-mechanical operation (actuation and transduction) of NEMS. This project is supported by the NSF under grant No. 0304446.

Kamil Ekinci
Aerospace and Mechanical Eng. Dept., Boston University

Date submitted: 30 Nov 2004 Electronic form version 1.4