

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Light scattering study of acoustic phonons in 300nm wide rectangular wires ANTHONY LINK, RUDRA BANDHU, R. SOORYAKUMAR, The Ohio State University, KONRAD BUSSMANN, Naval Research Laboratory — We have investigated the acoustic properties of 300 nm wide polymethyl methacrylate (PMMA) rectangular wires supported on a 100 nm thick silicon nitride (Si_3N_4) free-standing membrane by Brillouin light scattering. The large elastic mismatch between PMMA and Si_3N_4 results in effective confinement of most low frequency acoustic modes (< 20 GHz) to within the boundaries of the PMMA wire. For wave-vector transfer along the wire width, dispersionless excitations arising from mode quantization along the width and thickness of the PMMA wires are observed. In addition, dispersive signatures of the flexural mode of the Si_3N_4 membrane are evident. The mode amplitudes were analyzed using the *xyz* algorithm. Our results reveal the quantized character of the modes and the presence of dilatational, torsional, shear and edge type modes. The results are compared to the behavior of acoustic modes propagating along the wire axis.

Ratnasingham Sooryakumar
The Ohio State University

Date submitted: 22 Dec 2004

Electronic form version 1.4