Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

c-axis GaN nanowires for high-quality-factor mechanical oscillators[1] JASON GRAY, University of Colorado, KRIS BERTNESS, NORMAN SANFORD, National Institute of Standards and Technology, CHARLES ROGERS, University of Colorado — We report on the electromechanical properties of c-axis GaN nanowires in high-quality-factor mechanical resonators and oscillators. The nanowires are grown by catalyst-free molecular beam epitaxy, are single crystal, hexagonal in cross section, from 50 - 500 nm diameter, and 5 - 15 microns in length depending upon growth time. As-grown nanowires display singly-clamped cantilever mechanical resonances above 1 MHz, with typical resonance full width at half maximum power of less than 100 Hz i.e., a mechanical quality factor, Q, well above 10^4. We are attempting to obtain similar high-Q for processed nanowires, utilizing dielectrophoresis to position the nanowires within lithographic test structures, and nanowire metallization of two types: First, titanium/aluminum over the ends of the nanowires allows for ohmic contact formation and direct measurement of nanowire resistance versus strain. Second, a layer of aluminum over the entire length of the wires leads to a metallic backbone with a resistance on the order of 50 Ω. This is useful for simple magnetomotive measurements. We will discuss the processing steps and observed behavior.

[1]With support from GE and the Interdisciplinary Micro/Nano Electromechanical Transducers Center (iMINT) at CU-Boulder

Jason Gray
University of Colorado

Date submitted: 27 Nov 2007 Electronic form version 1.4