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Raman Measurement of Stress in High Aspect Ratio Double- and Single-Clamped Silicon Nanowires HANG CHEN, CRAIG KEASLER, ANNA SWAN, Department of Electrical and Computer Engineering, Boston University, Boston, MA 02215 — Silicon nanowires (Si NWs) have been widely used in sensor applications due to their small size and the concomitant unique optical, electrical and mechanical properties. Understanding and determination of the characteristic properties therefore plays a crucial role in the sensor design. We employ non-destructive micro-Raman measurements to probe the optical and mechanical features of Si NWs with diameter of 100 nm and lengths between 10-20 μm . We observe downshifts of the Si Raman peak, as compared to bulk silicon, indicative of stress in the Si NWs. Both fixed/fixed- and fixed/free-ends Si NWs are studied to evaluate the contributions to the stress from fabrication and surface effects. In addition, enhanced scattering intensities for the nanowires are both wavelength and polarization dependent, and we attribute them to a combination of optical resonator and scattering effects. Determination of the stress in the Si NWs from Raman frequencies will be explored.

Hang Chen
Department of Electrical and Computer Engineering,
Boston University, Boston, MA 02215

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