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**Strain sensitivity in the photocurrent of single wall nanotubes** PRASANTH GOPINATH, A. MOHITE, H. SHAH, J. LIN, B. NAGABHIRAVA, T. BANSAL, B. ALPHENAAR, University of Louisville — The energy spectrum of carbon nanotubes is highly sensitive to strain and mechanical deformation. Calculations predict a shift in the bandgap of single wall nanotubes (SWNT) with axial strain, which in turn affects the conductance[1]. We have measured the influence of strain on the photocurrent spectrum of SWNT's and observe as much as 600meV shift in the band gap energy of semiconducting nanotubes for 300 micro strains. The experiments were performed on SWNT's CVD grown on a 300$\mu$m thick quartz cantilever; the SWNT's are strained by pushing down on the free end of the cantilever. We use a capacitive photocurrent technique for detecting the photocurrent as a function of incident photon energy. The peak corresponding to the band- to-band free electron transition in the semiconducting nanotubes is observed to shift to lower energies with increasing strain. Further measurements using a fixed wavelength (488nm) Ar ion laser show as much as an order of magnitude change in the photocurrent with strain, implying a gauge factor of more than a 1000. Our measurements provide a direct probe of the influence of strain on the bandgap of SWNT's and open up the possibility of using SWNT's as optical strain sensors.

[1]Liu Yang et.al, Phys. Rev. B 60, 13874 (1999)

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