Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Measurement of Absolute Absorption Cross-section of Individual Carbon Nanotubes on a Substrate** LIHONG HERMAN, ADAM TSEN, JIWOONG TSEN, Cornell University — The absorption cross-section is one of the central parameters that determine the efficiency of most optical and optoelectronics processes in single-walled carbon nanotubes (SWNT), including photoluminescence, photodetection, and photovoltaic energy conversion. While absorption measurements on SWNT ensembles in solution provide a reliable estimate, the absolute absorption cross-secions of individual carbon nanotubes on and off resonance have not been reported. Here, we measure the absorption cross-section of SWNTs on chip with spatial resolution using lock-in technique with a spatial modulation of a focused laser spot near SWNTs. We measure the absorption cross-section of SWNTs near resonance to be on the order of $10^{-17}$ cm$^2$ per carbon atom, which is consistent with on-chip Rayleigh measurements as well as recent time-resolved photoluminescence measurements. Since our measurement is performed on SWNTs on chip, it can be directly applied to various optoelectronic devices made with SWNTs, thus allowing quantitative analysis of the fundamental performance limits of SWNT photovoltaic devices.

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Date submitted: 12 Dec 2011 Electronic form version 1.4