

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Narrow-band light emission from a single carbon nanotube p-n diode** MEGUMI KINOSHITA, Stony Brook University, THOMAS MUELLER, Vienna University of Technology, MATHIAS STEINER, VASILI PEREBEINOS, AGEETH BOL, DAMON FARMER, PHAEDON AVOURIS, IBM Thomas J. Watson Research Center — We present the first observation of electroluminescence from electrostatically-generated carbon nanotube (CNT) p-n junctions[1]. While CNT optoelectronics has made much progress in recent years, observations of emission from electrically excited CNT devices have been limited to the high-bias regime and with low efficiency. Furthermore, the resulting broad linewidths are broad, making it difficult to investigate electronic levels and carrier dynamics. We find that p-n junctions allow for better carrier control at lower power inputs, resulting in emission with near-zero threshold, low self-heating and efficiency two to three orders of magnitude greater compared to previous device configurations. This yields higher signal-to-noise ratio and narrower linewidths (down to  $\sim 35$  meV) that allows us to identify localized excitonic transitions that have previously been observed only in photoluminescent studies. [1] T. Mueller, M. Kinoshita, M. Steiner, V. Perebeinos, A. Bol, D. Farmer, and Ph. Avouris, Nature Nanotech., web publication, November 15 2009.

Megumi Kinoshita  
Stony Brook University

Date submitted: 20 Nov 2009

Electronic form version 1.4