Abstract Submitted
for the NWS12 Meeting of
The American Physical Society

Effects of gas adsorption on the conductance of suspended carbon nanotubes[1] BORIS DZYUBENKO, HAO-CHUN LEE, OSCAR VILCHES, DAVID COBDEN, Department of Physics, University of Washington — We have studied the effects of adsorbing a variety of gases on the electrical properties of individual suspended single-walled nanotubes, as a function of pressure and temperature. The quantity of gas adsorbed can be determined from the shift in the mechanical resonance frequency of the nanotube. We find that the conductance is sensitive to extremely small changes in density and can be measured on a timescale of milliseconds, permitting studies of the dynamics of the adsorbed atoms/molecules. The conductance varies nonmonotonically with coverage as a monolayer builds up and contains a contribution corresponding to charge transfer from the adsorbates of the order of one or two electrons in total. For noble gases, measurements below the 2D critical point on some devices show sharp features and fluctuations; in others these are absent. The reason for this is unclear and under investigation. In the nonlinear regime we observe features in the I-V characteristics as phase transitions are induced by the current and nonequilibrium stationary states occur.

[1]Supported by NSF grant DMR-1206208.

David Cobden
Department of Physics, University of Washington

Date submitted: 17 Sep 2012 Electronic form version 1.4