Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Electron Spin Resonance in Single-Walled Carbon Nanotubes[1] W. D. RICE, J. KONO, Rice University — We have performed electron spin resonance (ESR) measurements on various types of single-walled carbon nanotube (SWNT) samples. As catalyst particles were chemically removed from the SWNTs, the linewidth of the conduction electron spin resonance (CESR) signal became smaller, reaching 43 G at 5 K for acid-purified HiPco SWNTs. For every type of SWNT tested, a ferromagnetic resonance (FMR) signal was observed; we show that this is attributed to catalyst particles. The g-factor for the CESR signal was slightly shifted from the free electron value; as purity increased, the resonance moved closer to $g = 2.003$. The conduction electron signal increased as the temperature was decreased, indicating that we are observing both Pauli and Curie paramagnetism. No spin gap for either laser-oven acid-purified or HiPco acid-purified SWNTs was seen when the temperature was taken from 295 K to 5 K. In addition, the FMR signal decreased as the temperature was decreased. SWNTs suspended in aqueous surfactant solutions were also measured. As a function of purity, the FMR signal was substantially decreased. We show that as a function of metal catalyst content, the ESR lineshape of SWNTs changes significantly.

[1]This work was supported by ARO Grant No. 49735-PH.

William Rice
Rice University

Date submitted: 27 Nov 2007 Electronic form version 1.4