Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

High Temperature Conductivity and Reactivity of Carbon Nanotube Electronic Circuits ALEXANDER KANE, PHILIP G. COLLINS, Department of Physics and Astronomy, University of California Irvine, Irvine, CA 92697-4576 — At sufficiently high temperatures, carbon nanotubes (CNTs) begin to react with their immediate environment. For example, adsorbates first desorb, then the carbon may react with connective electrodes, and ultimately Stone-Wales defects become mobile and can be annealed. We have designed and built an apparatus to study electronic transport in individual CNTs under these extreme conditions. Our apparatus provides continuous, four probe measurements of impedance and transimpedance from room temperature to 1500 K in an ultrahigh vacuum (UHV) system. By heating the devices to such temperatures, we are able to study the onset and progress of reactions, and the UHV environment allows for precise control of the local surface chemistry. Furthermore, the devices can be heated either resistively or radiatively at rates exceeding 100 K/min, allowing for pulsed thermal processing and an investigation of photoinduced chemistries. We will present results on the high temperature resistance of CNT devices in a UHV environment, and preliminary results indicating irreversible chemical changes which occur at high temperatures.

Philip G. Collins
Department of Physics and Astronomy, University of California Irvine
Irvine, CA 92697-4576

Date submitted: 14 Dec 2004 Electronic form version 1.4