Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Controlled Confinement and Release of Gases in Single-Walled Carbon Nanotube Bundles CHRISTOPHER MATRANGA, BRADLEY BOCKRATH, U. S. Dept. of Energy, National Energy Technology Laboratory — A simple procedure is described which locks small quantities of SF_6, CO_2, and $^{13}CO_2$ into opened single-walled carbon nanotube (SWNT) bundles and keeps the gas inside the SWNTs above the desorption temperature of these molecules. The confinement technique involves opening the SWNTs with ozonolysis at 300 K followed by vacuum annealing at 700 K. Gases are then cryogenically adsorbed into the opened SWNTs and a locked into the SWNT pores by functionalizing the sample with a low temperature ozone treatment. The low temperature ozone treatment functionalizes the entry ports into the SWNT pores which in turn create a physical barrier for gases trying to desorb through these functionalized ports. The samples are stable under vacuum for periods of at least 24 hours and the trapped gases can be released by vacuum heating to 700 K. Reduced quantities of the trapped gases remain in the SWNTs even after exposure to room air. Fourier Transform Infrared Spectroscopy is used to monitor the functionalities resulting from the ozone treatment and to detect the trapped gas species.

Christopher Matranga
U. S. Dept. of Energy, National Energy Technology Laboratory

Date submitted: 23 Nov 2005 Electronic form version 1.4