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Transport and Optical Investigations of Substitutional and **Trapped Nitrogen in Carbon Nanotubes**¹ ALI QAJAR, University of Texas, Austin, DANHAO MA, The Pennsylvania State University, RAMAKRISHNAN RA-JAGOPALAN, The Pennsylvania State University-DuBois, KOFI ADU, The Pennsylvania State University-Altoona College, GAMINI SUMANASEKERA, University of Louisville — Multiwall carbon nanotubes that contain nitrogen were synthesized using acetonitrile as the precursor and ferrocene as the catalysis. X-ray photoelectron spectroscopy detected ~ 2 atomic % nitrogen in the carbon nanotubes with ~ 1 atomic% of the nitrogen as substitutionally doped in the carbon nanotubes skeletal structure and 1 atomic% present as gaseous nitrogen trapped inside the nanotubes. Investigation of the temperature dependent transport properties (thermoelectric power and resistivity) and the phonon modes of the CNTs and the trapped gaseous nitrogen are used to further substantiate the XPS results. High pressure adsorption of CO_2 at room temperature also confirmed no porosity accessible for CO₂ molecules. Transmission electron microscopy (TEM) showed presence of corrugations and wisps in the carbon nanotubes framework attributed to the curvature induced by nitrogen atoms.

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