

Abstract Submitted
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Scientific Investigation over the Interactions of Polar and Non-Polar Gases with Carbon Nanotubes using Microwave Spectroscopy

JAMES ROBERTS, AMAN ANAND, University of North Texas, Denton, TX, JAIN N. DAHIYA, Southeast Missouri State University, Cape Girardeau, MO — A resonant cavity in the TE_{011} mode is used as a probe to study the gas absorption in loaded nanomaterials with high surface area to mass ratio. The microwave Network Analyzer was used to study the gas absorption effects for gas pressure and frequency at room temperature. Multiple runs for polar and non-polar gases were studied for the comparing the adsorption strengths. Polynomial plots were used to measure the complex dielectric constant of the loading medium. Standard perturbation techniques were used to study the E and B field vector responses inside the cavity. The Interaction of the load and the fields can be described by the equation, $Z = f_1(\mu_e, E) - f_2(\mu_m, H)$, where $f_1(\mu_e, E)$ is a function of the electric permeability μ_e and the electric field, while $f_2(\mu_m, H)$ is a function of the magnetic permeability μ_m and the magnetic field. Gas absorption during irradiation of the CNTs affects the load in the resonant cavity, produces the frequency shifts and also changes the Q factor of the cavity. The quantitative measurement of hysteresis between pressurizing and de-pressurizing gave the relativistic adsorption characteristics of the samples inside the cavity.

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