Presentation for Assistant Professor Position
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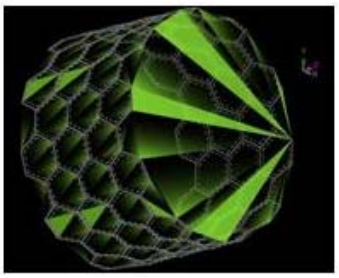
Dept. of Physics
Univ. of Memphis, TN



"Research in Material Studies and Applied Electromagnetism"

Abstract:

An experimental investigation of gas adsorption by single walled carbon nanotubes loaded in microwave resonant cavity is being presented in this talk. A microwave resonant cavity operating in TE_{011} mode was employed to measure the complex perturbation response of gas molecules and Single Walled Carbon Nanotubes. Energized using a microwave network analyzer the resonant frequency of the device was chosen in a geometry favorable range of 9.1-9.8 GHz.

Results presented in this talk, are indicative of the selective adsorption response of SWCNT for different gases such as carbon dioxide, carbon monoxide, oxygen and hydrogen. Due to the various exchange mechanisms such as van der Waals' and columbic forces it has been observed that there exists a specific degree of affinity by SWCNTs towards different gases. Slater's Perturbation theory and analytical models such as Claussius-Mossotti and Langevin-Debye relationships assisted in understanding the interaction behaviors of gases with nanomaterials. The scientific results obtained from this investigation led to the development of a chemical biological sensor prototype. The method proposed is to develop operational sensors to detect toxin gases for homeland security applications and also develop "sniffers" to detect toxin drugs for law enforcement agency personnel. Also apportioned in this talk a brief section over the possible applications of applied electromagnetism towards lithography and plasma spectroscopy will be discussed.

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