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Functionalized Nanomaterials to Sense Toxins/Pollutant Gases Using a Resonant Cavity¹ JAMES ROBERTS, University of North Texas, JAI DAHIYA, Southeast Missouri State University, AMAN ANAND, University of North Texas — This paper provides an overview of the techniques and methods involving electromagnetic resonators to study the interactions of gas molecules with substrates. A resonant cavity operating in TE_{011} mode was employed to characterize the nature of interactions of a range of weakly polar to non-polar gas molecules with carbon nanotubes loaded in the cavity. Resonant cavities are special electromagnetic resonators which can have a very high quality factor; which enhances the sensitivity of the apparatus as compared to standard electrical tank circuits. Shifts in the resonant frequency of these circuits for gas pressure changes provides a highly effective means to quantify the nature of agents perturbing the cavity. By functionalizing the nanomaterials with specific anti-bodies and loading them as wicks in these cylinders, the technique can be engineered into a very sensitive and unique chemical and biological sensor prototype.

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