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## Carbon nano tube gas sensor using thin wire dipole antenna

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Carbon Nano tube (CNT) with its unique thermal, mechanical, electrical and chemical property provide sound mechanism for gas sensing and its density measurement. The attribute of CNT in retaining these properties even after forming a wide surface area to provide consistent and reliable result makes it an excellent material for a wide range of applications. The multi wall carbon nano tube (MWCNT) and Graphene based doping /hybrid (alloy with other metallic elements or polymer components and functionalisation of CNT with other materials) solutions enhance these electrical, physical and chemical properties further. In addition, the nano-structure property of the CNT provides a promising potential for its application. This paper talks about the design and modeling of  $\text{FeCl}_3$  doped thin film CNT based transducer element with the structure of 5 GHz range dipole antenna (using a thin wire dipole) for gas sensing and detection. The doped unrolled MWCNT based structure have been used to enhance its electrical conductivity to provide a comparative conductivity of other existing metals such as copper, silver and gold which combined with its high surface area provides a highly accurate, consistent and sensitive detection at given operating conditions. The change in electrical conductivity or electron mobility of the CNT diffused element within the vicinity of gas particles is a good source of gas particle measurement. Different gas particles such as  $\text{O}_2$ ,  $\text{NO}_2$ ,  $\text{NH}_3$ ,  $\text{SO}_2$ ,  $\text{CO}_2$  and CO when exposed over an enclosed CNT dipole antenna within an enclosure shows a shift in its resonant frequency (in comparison of unexposed CNT sheet of 5 GHz resonance), which provides a sound mechanism for particle type and density measurement. As the electrical conductivity of CNT is also sensitive to temperature, pressure and moisture present in the environment, the design methodology has been calibrated for these parameters while obtaining the result.

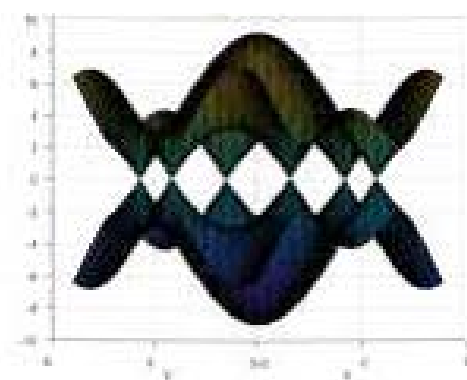


Figure 1: Energy surface of SWCNT

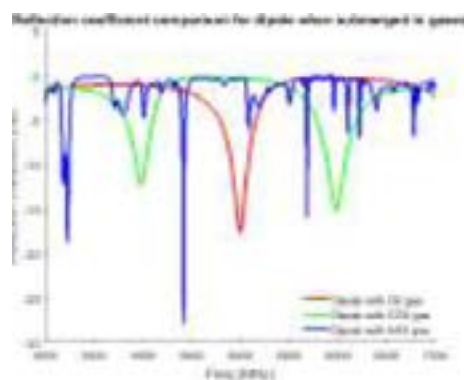


Figure 2: Resonant behavior for CNT thin wire in gases

### Recent Publications

1. Kumari A, Jana RK (2013) Extraction of metals from sea-nodules using buffered sodium chloride media. Indian chemical engineer 55: 1-8.
2. Nichani K, Bapat S, Kumari A (2014) A study of combating climate change with carbon capture and sequestration. International journal of engineering and technical research 2: 269-272.
3. Maskaria K, Kadam SK, Kumari A (2015) Study on zero discharge plant for waste water treatment of pharmaceutical industry. International journal of latest trends in engineering and technology 7: 98-102.
4. Kumari A, Mohammed S, Rumane N, Bholla R, Bhawnani S (2016) Improving the dissolved oxygen levels in waste water using oxygen concentrator. GE-International journal of engg. research 4: 1 -9.

5. Tholan PV, Kumari A (2017) an innovative method for waste water treatment using fluidized media bio reactor process. research journal of pharmaceutical, biological and chemical sciences 8: 184-190.

### **Biography**

Anita Kumari has done PhD in Chem. Engg. from IIT, Delhi. Currently working as Prof. and Head of Chemical Engg. Dept. at Thadomal Shahani Engg. College, Mumbai Univ. She is also working as Executive Committee member (worked as Honorary Secretary, Joint Secretary & Joint Treasurer) of Indian Institute of Chemical Engineers - Mumbai Regional Center (IICHE-MRC) since 2011. Worked as organizing committee member for organizing various national and international events of IICHE-MRC. She has organized many conferences, seminars, refresher courses, workshops, industrial plant & R&D center visits for the students and Chemical Engg. Professionals. To update her knowledge and teaching qualities, networking with same professional engineers and also to fill up the industrial-academic gap she has participated in about 70 workshops, conferences, seminars and panel discussions related to societal and technical issues. Presented 31 research papers at various national /international conferences. Published 21 papers in various international journals.

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### **Notes:**