

Poster presentation

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## Emerging trends of nanomanufacturing by CVD method and electrical properties of CNT

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This paper focuses on the emerging trends on manufacturing of CNT and electronics of CNT based devices especially CNT-MEMS devices. We have worked to suggest some innovative ways of fabrication of CNT and CNT based devices for Indian specific needs and their integration with MEMS devices in Indian specific scenario. We have described both CVD (chemical vapour deposition) and PECVD (plasma-enhanced CVD) and tried to suggest some solutions for the existing problems and have made an algorithm for building simulation software for CNT fabrication. These two techniques are the main used for CNT and have proved to be the most reliable and economical. We have also taken in account the Indian prospective in CNT manufacturing. The metal catalysts and the substrate used are discussed and methods for selective growth of CNTs are also discussed with the characterization techniques used. We have calculated and described the electrical properties and physics of CNT, which is important in their application in electronics. We have described in detail about the alignment depending upon the alignment of the carbon atoms in the cylindrical form, SWNTs can be either act as metals or semiconductors and yet retain the same basic nanotube structural. We have also shown mathematically that CNT can be metallic and semi conductive depending on the combination of diameter and pitch or, more specifically, chiral vector of CNT expressed by two kinds of non-negative integers (a, b). We have also worked on the applications for Indian needs and tried to build an algorithm for designing and investigating of some parameters of CNT in our software "Nanowave". Our focus has also been to work out the problems in technical as well economical that exists in

CNT manufacturing and how Indian companies and research lab can tackle them. We have built a application to simulate and calculate reliability of CNT and also developed one to simulate packaging issues regarding CNT and MEMS device. We have tried to build an innovative algorithm for complex CNT calculations regarding properties as well as characterization of CNT. Our software uses OpenGL libraries and some VB programming. We have made MEMS simulation software with 3D viewing. We have built an algorithm to calculate and generate the geometry of CNT.