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USAGE OF TWO PROBES METHOD FOR MODELLING OF NANO STRUCTURE CHARGE TRANSPORT

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ABSTRACT: Implementation of modeling of charge transport in Neno structure using two probes method has been proposed. Nanotechnology is manipulation of matter on an atomic, molecular and supra molecular scale. Earliest, widespread description of Nanotechnology referred to particular technological goal of precisely manipulating atoms and molecules for fabrication of macro scale products. Now it has been referred to as molecular Nanotechnology. In this research MATLAB has been used to make comparative study of traditional and Nano based devices performance considering several factors such as Cost, Power consumption, portability, quality factor, mass production, & Environment friendly. The factor such as energy consumption, energy efficiency & delayed efficiency are alos considered here. Molecular Nanotechnology has been termed as technology that is dependent on ability to develop structures to complex, atomic specifications. This technology is based on concept of Nano arrangements of machines to explore new components from existing ones. It doesn't works on randomization of molecules but on systematic positioning of every single molecule. The research would withdraw conclusion and discuss the scope of research according to results and discussion.

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Keywords: Nanotechnology, Molecular Electronics, CMOS, Molecular junction

[1]INTRODUCTION

Nanotechnology is manipulation of matter on an atomic, molecular, & supra molecular scale. Earliest, widespread description of Nanotechnology referred to particular technological goal of precisely manipulating atoms & molecules for fabrication of macro scale products, also now referred to as molecular Nanotechnology. A more generalized description of Nanotechnology was subsequently established by National Nanotechnology Initiative, which defines Nanotechnology as manipulation of matter with at least one dimension sized from 1 to 100 Nanometers. This meaning mirror information that quantum mechanical result are important at this quantum realm scale, & so definition shifted from a particular technological goal to a research category inclusive of all types of research & technologies that deal with special properties of matter which occur below given size threshold. It is familiar to see plural form Nano technologies as well as Nano level technologies to pass on to broad range of scanner & supplications whose common trait is size. It is frequently used in electrical power engineering[10].

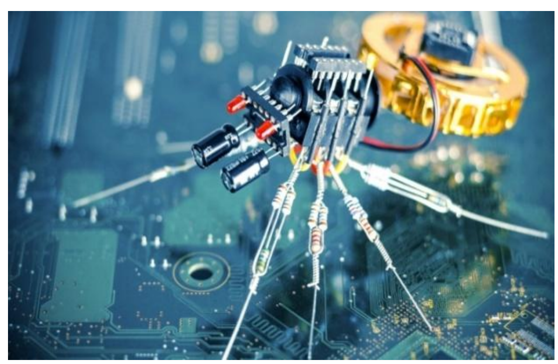

Fig 1 NANOTECHNOLOGY

APPLICATION OF NANOTECHNOLOGY

The Understanding Nanotechnology Website is dedicated to providing clear & concise explanations of Nanotechnology applications. Scan listings below to find an application of interest, or use navigation bar above to go directly to page discussing an application of interest.

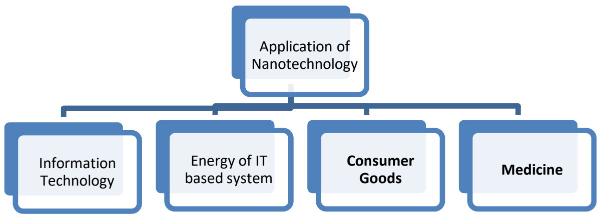

Fig 2 APPLICATION OF NANOTECHNOLOGY

[2] MOLECULAR ELECTRONICS

Recent improvements in the study of single-molecule junctions have, however, led to the discovery of a variety of novel effects, which could have an impact on a range of applications. This focus issue examines the challenges and opportunities for the field. Molecular electronics refers to the subdivision of nanotechnology and nanoelectronics that is responsible for electronics development and design using nano building blocks. All modern fabrication of integrated circuits and electronic devices is possible due to advancements in molecular electronic since the early 1970s, researchers have looked to use individual molecules as functional building blocks in electronic circuits, but the field of molecular electronics has been hampered by significant experimental challenges and practical devices have remained elusive. This is one of many possible ways in which a molecular level diode / transistor might be synthesized by organic chemistry. A model system was proposed with a spiro carbon structure giving a molecular diode about half a nanometre across which could be connected by polythiophene molecular wires. Theoretical calculations showed the design to be sound in principle and there is still hope that such a system can be made to work.

[3] MOLECULAR JUNCTION

At present, metal–molecular tunnel junctions are recognized as important active elements in molecular electronics. This gives a strong motivation to explore physical mechanisms controlling electron transport through molecules. In the last two decades, an unceasing progress in both experimental and theoretical studies of molecular conductance has been demonstrated. In the many work researches give an overview of theoretical methods used to analyze the transport properties of metal–molecular junctions as well as some relevant experiments and applications. After a brief general description of the electron transport through molecules authors introduce a Hamiltonian which can be used to analyze electron–electron, electron–phonon and spin–orbit interactions. Then they turn to description of the commonly used transport theory formalisms including the nonequilibrium. The metal and the molecular orbital hybridize at the interface, and charge transfer occurs between the metal electrode and the molecule. The physical and chemical characteristics of the molecule in the single-molecule junction are modified from those of an isolated molecule and molecules in a bulk molecular crystal.

[4] OBJECTIVE OF RESERCH

The several objective of this research has been discussed below:

1. To study the existing need and challenges in field of Nanotechnology.
2. To perform comparative analysis of tradition work with proposed work in order to represent how proposed model is better than previous.

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3. Modelling of charge transport using two probe method.

4. To withdraw conclusion and discuss the scope of research according to results and discussion.

[5]RESEARCH GAP

Nanotechnology is gaining importance rapidly as a most powerful technology. Its immense potential promises possibility of significant changes in near term future, once most essential machines called Universal Assembler &Nano computer are built. Present research aims to reviews previous work done & recent advancements in field of Nanotechnology. Authors have proposed investing in Nanotechnology to represent a redirection of existing budget lines. Many researchers presented researches on resonant electron tunneling through azurin in air and liquid by scanning tunneling microscopy. Some researchers have stated the current status of Nanotechnology in Arab Gulf States. A growing number of Nanotechnology research, education and industry initiatives have been recently launched by several Arab Gulf States to quickly build scientific capacity and track the worldwide developments in Nanotechnology. Many researchers discussed on Nanotechnology progress and future opportunities. Nanotechnology R&D has changed its focus, industrial relevance and governance since 2000 when was proposed in various national programs as a key science and technology development for 21st century.

[6]PROPOSED WORK

In proposed model Nano technology has been compared with traditional. Here we would make comparative analysis with performance of traditional technologies with modern technology. The base for comparison is performance, power consumption, and Heat generation, Technical feasibility of implementation, portability & Limitation of traditional technologies.

Molecular Nanotechnology has been termed as technology that is dependent on ability to develop structures to complex, atomic specifications. It is performed using mechanosynthesis. It is different from Nanoscale materials.

Molecular Nanotechnology is quite different from Nano technology; it works at molecular level. It arranges & configures its devices& instruments atomically. This technology is based on concept of Nano arrangements of machines to explore new components from existing ones. It doesn't works on randomization of molecules but on systematic positioning of every single molecule.

[7]RESULT & DISCUSSION

In this research MATLAB has been used to make comparative study of traditional and Nano based devices performance considering several factors such as Cost, Power consumption, portability, quality factor, mass production, & Environment friendly. We have considered energy consumption, energy efficiency & delayed efficiency.

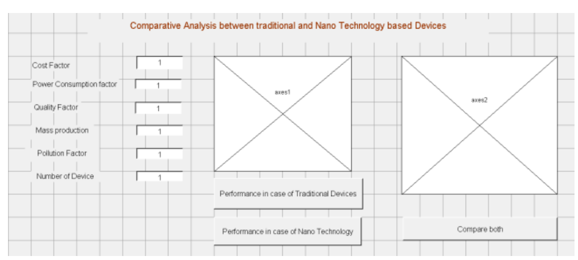

Fig 3 Pollution factor U

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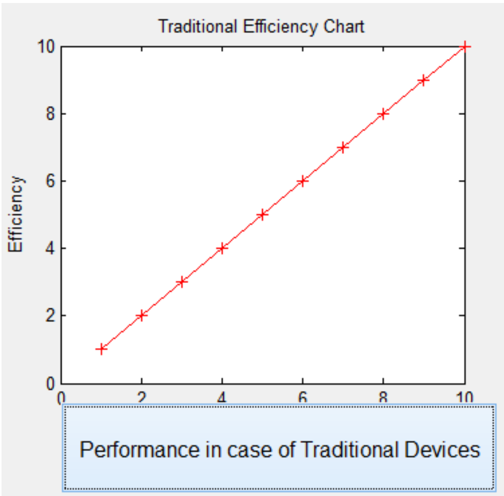

Fig 4 Performance in case of TD

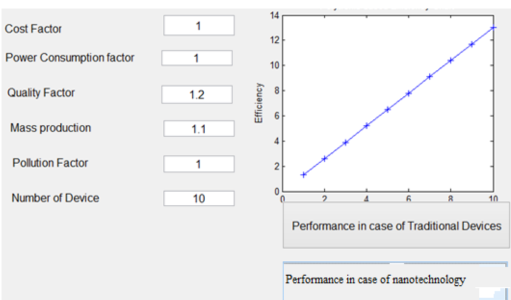

Fig 5 Performances In Case Pd

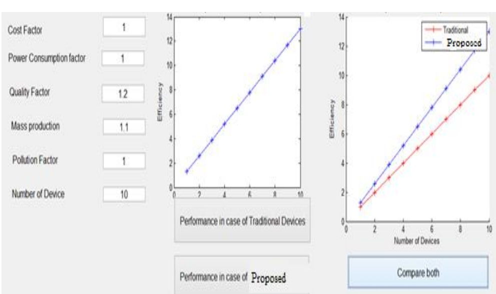

Fig 6 Cost factor is , power consumption factor

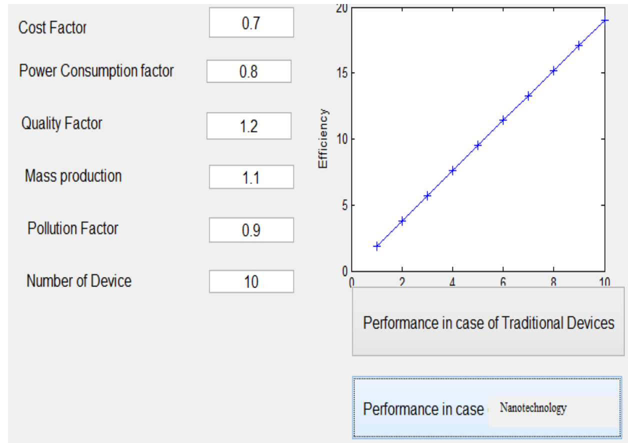

Fig 7 Cost factor is 0.7, power consumption factor

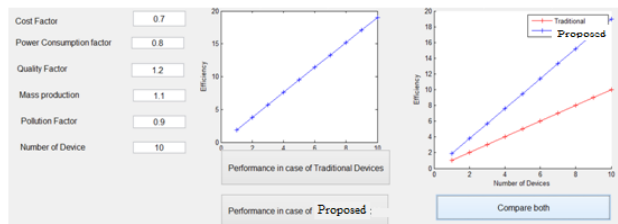

Fig 8 Comparative Analysis between &Nanotechnology based device

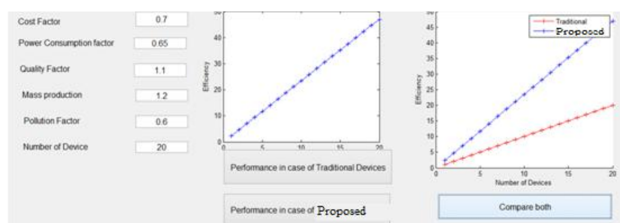

Fig 9 Comparative Analysis between & Nanotechnology based device

[8]CONCLUSION

In scope of these new findings it seems possible that Nanotechnology solves present & coming problems & add new functionality to microelectronic circuits & systems. Nanotechnology creates a new & very promising technological area with new applications & products. Research on polymer electronics is not a fancy of well equipped laboratories which have too much time & money. Nanotechnology be one technology besides other for future electronic systems.The age of Nanotechnology electronic had begun. It is not primarily a replacement for existing electronic technologies, but opens up prospect of completely new applications that combine features of transistor, LED, detector & interconnect devices with freedom of design, flexibility & low cost of plastics.

[9]FUTURE SCOPE

The research work would provide the study the existing need and challenges in field of Nanotechnology. It would perform the comparative analysis of tradition work with proposed work in order to represent how proposed model is better than previous. The research work has considered the Modelling of charge transport using two probe methods. It would withdraw conclusion and discuss the scope of research according to results and discussion.

REFERENCES

1. Mobasser, Shariat & Firoozi, Ali. (2016). Review of Nanotechnology Applications in Science and Engineering. 6. 84-93. C. R. K. Marrian, "Investing in nanotechnology" 1 p-4-1, p. 72.
2. C.R.K. Marrian (2001) Investing in nanotechnology.
3. B. Alfeeli, T. Mohiuddin, and K. Saoud, "Current Status of Nanotechnology in Arab Gulf," 2012.
4. P. K. Paul, "Nanotechnology Computing having special references to Cloud Computing and Big Data Management: Techno Managerial Knowledge Study," pp. 1–5, 2017.
5. J. E. Morris, "Laboratory Course in Nanotechnology," pp. 267–270, 2015.
6. G. W. Hinkal, D. Farrell, S. S. Hook, N. J. Panaro, K. Ptak, and P. Grodzinski, "Engineering a Change in Cancer Diagnosis and Therapy through Nanotechnology," 2011.
7. Mihail C. Roco "Nanotechnology progress and future opportunities: 2000–2020", 2010.
8. Mrs. Tondare S.P. (2001) "Nanotechnology & Its Advent In Electronics & Communication Networks" International Journal of Computer Science & Engineering Technology, Volume 3 Issue, Value: 13.98 Issn: 2321-9653
9. Atsushi Ogasawara (2004) "Applying Nanotechnology to Electronics", Recent Progress in Si-LSIs to Extend Nano-Scale MRS Bulletin, p. 838, Vol. 29, No. 11, Nov. 2004.
10. Sumereder Prospects (2007) "Nanotechnology in Electrical Power Engineering", 19th International Conference on Electricity Distribution Vienna, 21-24 might 2007
11. Alain De Neve Military (2011) "Uses Of Nanotechnology & Converging Technologies", Trends & Future Impacts Journal Of Electronic Defense, Vol. 30, No. 9.
12. R. D. Handy (2012) "Fsbi Briefing Paper: Nanotechnology in Fisheries & Aquaculture", Journal of Research in Engineering General Engineering Volume 12 Issue 4 Version 1.0 Year 2012
13. Kuldeep purohit (2012) "Fresh Advances in Nano technology", International Journal of Scientific & Engineering Research, Volume 3, Issue 11, November-2012
14. **Anna Pratima G. Nikalje (2015)Nanotechnology and its Applications in Medicine**

15. Ratner, Mark. (2002). Introducing molecular electronics. Materials Today. 5. 20–27. 10.1016/S1369-7021(02)05226-4.

16. V Aradhya, Sriharsha & Venkataraman, Latha. (2013). Single-molecule junctions beyond electronic transport. Nature nanotechnology. 8. 399-410. 10.1038/nnano.2013.91.

17. 18. Kandil, Magy"THE ROLE OF NANOTECHNOLOGY IN ELECTRONIC PROPERTIES OF MATERIALS". 2016

18. S. Hassan M. Jafri1,2, Henrik Löfås3, Tobias Blom1, Andreas Wallner4, Anton Grigoriev3, Rajeev Ahuja3,5, Henrik Ottosson4 & Klaus Leifer1"Nano-fabrication of molecular electronic junctions by targeted modification of metal-molecule bonds"2015

19. M. A. REED, C. ZHOU, M. R. DESHPANDE, AND C. J. MULLER "The Electrical Measurement of Molecular Junctions"

20. .https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwi1l5rNmsLhAhUq7XMBHQE-DssQjRx6BAgBEAU&url=https%3A%2F%2Fwww.analyticsindiamag.com%2Fcan-nanotechnology-build-the-ai-of-the-future%2F&psig=AOvVaw0KDImqosUhPPqEaBJw71SO&ust=1554871690845289

21. https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwjivaWEnMLhAhWbF3IKHWKdCK4QjRx6BAgBEAU&url=https%3A%2F%2Fwww.quora.com%2FHow-is-nanotechnology-making-inroads-into-our-food-agriculture-environment-health-and-life&psig=AOvVaw02G-qb7oNfeU7bIfQy13Fo&ust=1554871954317293

22. D. Newberry, "Nanotechnology : Exemplifing the Essence of STEM Education," pp. 234–238, 2014.

23. D. M. Newberry, "A Modularized Approach to Nanotechnology Education : Opportunities , Challenges and Requirements," 2012.

24. V. Frascerra, F. Calabi, G. Maruccio, P. P. Pompa, R. Cingolani, and R. Rinaldi, "Resonant Electron Tunneling Through Azurin in Air and Liquid by Scanning Tunneling Microscopy," vol. 4, no. 5, pp. 637–640, 2005.

25. G. W. Hinkal, D. Farrell, S. S. Hook, N. J. Panaro, K. Ptak, and P. Grodzinski, "Engineering a Change in Cancer Diagnosis and Therapy through Nanotechnology," 2011.

26. C. R. K. Marrian, Investing in nanotechnology "1 p-4-1," p. 72. **2001**

27. Å. Jämting and J. Miles, "Metrology for Nanotechnology," pp. 56–58, 2008.

28. C. R. B. Mcconachie, "Practical Issues In Commercial And Regulatory Development Of Nanotechnology The Good , the Bad and the Ugly," pp. 870–873, 2008.

29. G. Iannaccone *et al.*, "Towards nanotechnology computer aided design : the NANOTCAD project," pp. 117–122, 2001.

30. R. R. Mcwhorter and K. A. Lindhjem, "Virtual Learning Environments," no. June, pp. 15–17, 2013.

31. T. A. E and S. E. Lyshevski, "Nanotechnology - Quantum Information Theory - and - Quantum Computing," 2002.

32. D. M. Newberry, . Nanotechnology: A platform for education change. "I," 2012.

33. N. Fletcher, "Nanotechnology in Australia—A Network of Interactions," no. September, pp. 19–22, 2008.

34. N. Alcheikh, L. Kosuru, S. N. R. Kazmi, and M. I. Younis, "In-plane air damping of NEMS and MEMS resonators," *2018 IEEE 13th Annu. Int. Conf. Nano/Micro Eng. Mol. Syst.*, pp. 225–228, 2018.

35. S. N. R. Kazmi, S. Ilyas, P. M. F. J. Costa, and M. I. Younis, "Mechanical Computing Using Multifrequency Excited NEMS Resonator," *2018 IEEE 13th Annu. Int. Conf. Nano/Micro Eng. Mol. Syst.*, pp. 229–233, 2018.

36. A. Kakati, "Nano-Structured Gold Strain Gauge Arrays on PDMS for Highly Sensitive NEMS Pressure Sensor Skin," pp. 611–614, 2017.

37. M. F. Chowdhury, S. Boual, R. Hopper, and F. Udrea, "Development of Plasmonic MEMS CMOS Infrared Sensors for Occupancy Detection," pp. 97–100, 2016.
38. G. Tao, "Inverse eigenvalue analysis techniques for coupled M / NEMS resonators," pp. 17–20, 2016.
39. S. Z. Ali *et al.*, "A Low-Power , Low-Cost Infra-Red Emitter in CMOS Technology," *IEEE Sens. J.*, vol. 15, no. 12, pp. 6775–6782, 2015.
40. D. Yamane, M. Takayasu, H. Ito, S. Dosho, N. Ishihara, and K. Masu, "A Sub-1G CMOS-MEMS Acceler ometer," pp. 5–8, 2015.
41. S. Z. Ali *et al.*, "Low Power NDIR CO 2 Sensor Based on CMOS IR Emitter for Boiler Applications," pp. 5–8, 2014.
42. J. West, Y. S. Choi, and C. Vartuli, "Practical Implications of Via-Middle Cu TSV-induced Stress in a 28nm CMOS Technology for Wide-IO Logic-Memory Interconnect," pp. 101–102, 2012.
43. M. Wei *et al.*, "Mixer in a 180 nm CMOS Technology," pp. 379–382, 2011.
44. M. A. Khan, D. Kalim, and R. Negra, "Analysis and design of an unconditionally stable common-drain class-B RF power amplifier in 90 nm CMOS technology," *2011 Work. Integr. Nonlinear Microw. Millimetre-Wave Circuits, INMMiC 2011*, no. 1, pp. 4–7, 2011.
45. D. Kalim, D. Erguvan, and R. Negra, "Study on CMOS class-E power amplifiers for LTE applications," vol. 8, no. c, pp. 186–189, 2010.
46. D. Kalim, D. Erguvan, and R. Negra, "Broadband CMOS class-E power amplifier for LTE applications," pp. 2–5, 2009.
47. T. Ghani, "Innovations to Extend CMOS Nano-transistors to the Limit," p. 60558, 2008.
48. E. Ollier *et al.*, "NEMS based on top-down technologies : from stand-alone NEMS to VLSI NEMS & NEMS-CMOS integration," 2008.
49. H. Iwai, "Recent Status on 1ano CMOS and Future Direction," pp. 1–5, 2006.
50. X. Zheng, C. Wrigley, and B. Pain, "High Responsivity," pp. 138–139, 2000.
51. https://www.intechopen.com/media/chapter/48573/media/image2.jpeg
52. https://www.researchgate.net/profile/David_Vonlanthen/publication/283056096/figure/fig33/AS:668582212026382@1536413829422/The-two-research-topics-in-Molecular-Electronics-A-Bulk-Molecular-System-Material.png