Qeios

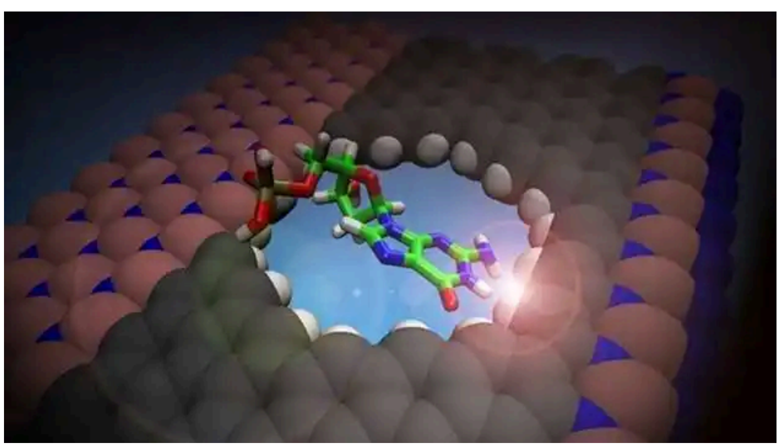
Peer Review

Review of: "carbon nanotubes (CNTs) Nanomicroelectronics"

Maria Cruz[1]

1. Electronic Digital, New America, Washington D.C., United States

Nanosensors using single-walled carbon nanotubes Semiconductors Using electronic conduction, which is grown by CVD on a substrate and connecting a wire to the nanotubes and creating a metal/nanotube/metal structure, a nanotransistor can be made that can change conductivity when different voltages are applied. The electrical conductivity of these nanotubes is used in the structure of single-walled carbon nanotube electronic nanosensors and nanosensors. A hole-doped semiconductor that reduces electrical conductivity threefold when a positive gate voltage is applied to this nanosensor system. In the presence of electronic conduction, the valence band of the nanotube moves away from the Fermi level, which leads to a decrease in the number of holes and, as a result, a decrease in electronic conduction . The Fermi energy of CNT nanotubes and CNTs shifts to the valence band. This increases the concentration of holes in the nanotube, thereby improving the electrical conductivity in the nanosensors.



Carbon nanotubes have a fullerene-like structure that can be capped at the ends. These nanostructures are named after their physical form, in which a graphene sheet is rolled up with

doi.org/10.32388/UOM6VO

different rolling angles to form tubes with different symmetries. The rolling angle and radius of the tube determine whether these nanostructures exhibit metallic or semiconducting properties. Nanotubes are divided into two groups: single-walled carbon nanotubes (SWCNTs) and multi-walled carbon nanotubes (MWCNTs). In multi-walled nanotubes, multiple graphene sheets are rolled up. Carbon nanotubes naturally stick together due to van der Waals attraction.

[1][2][3][4][5][6][7][8][9][10][11][12][13][14][15][16][17][18][19][20][21][22][23][24][25][26][27][28][29][30][31][32][33][34][35][36]

References

1. ^*Afshin Rashid. (2023). Review of: "Nano wire immersion method (structure and function)". Qeios. doi:10.32388/0od0gl.*
2. ^*Afshin Rashid. (2023). Review of: "Propagation of Oligophenylene vanillin nanowires by focused ion beam (FIB) nanolithography method (below ۱۰۰ nm - ۱۰ nm range)". Qeios. doi:10.32388/whhfa8.*
3. ^*Afshin Rashid. (2023). Review of: "Oligophenylene vanillin (silicon/germanium) structured nanowires and cylinders for possible applications in electronic energy". Qeios. doi:10.32388/i5wrmf.*
4. ^*Afshin Rashid. (2023). Review of: "High speed (doping) nMOS graphene transistor in p- and n-doping electronic circuits (positive and negative)". Qeios. doi:10.32388/jreu5m.*
5. ^*Afshin Rashid. (2023). Review of: "(Field effect nano transistors) Nano transistor electronic quantity and ionization potential)". Qeios. doi:10.32388/464lg7.*
6. ^*Afshin Rashid. (2025). (Nanocommunications) Short pulse modulation techniques in the time domain. SSRN Journal. doi:10.2139/ssrn.5193992.*
7. ^*Afshin Rashid. (2025). Definition of (Nanocommunication): Communication Between Two Nanoparticles Through Chemical Signaling. SSRN Journal. doi:10.2139/ssrn.5193996.*
8. ^*Afshin Rashid. (2025). Nanocommunications) Antennas used at the nanoscale of about a few tens of terahertz, including wavelengths in the region (infrared, visible, and ultraviolet. SSRN Journal. doi:10.2139/ssrn.5193987.*
9. ^*Afshin Rashid. (2025). Micro-vibrations in Current Nanocommunication Signals. SSRN Journal. doi:10.2139/ssrn.5198940.*
10. ^*Afshin Rashid. (2025). "Nanocommunications" (noise) Low-frequency random oscillations in many nanocommunications devices, including nanoelectronics. SSRN Journal. doi:10.2139/ssrn.5198944.*

11. ^Afshin Rashid. (2025). Optical Nanoantennas (a Practical Solution With High Efficiency Compared to Other Technologies). SSRN Journal. doi:10.2139/ssrn.5206746.
12. ^Afshin Rashid. (2025). Difference between nanotube antennas and classic antennas (wave speed in nanotubes is about one hundred times slower than the speed of light). SSRN Journal. doi:10.2139/ssrn.5206742.
13. ^Afshin Rashid. (2025). There Are Several (Nano-Communication) Technologies That Require The Use of External Excitation and Measurement to Work. SSRN Journal. doi:10.2139/ssrn.5216841.
14. ^Afshin Rashid. (2025). The Tasks of The Nano Transmitter TN and Receiver RN are Operational Such as (Performing Baseband Processing , Frequency Conversion, Filtering, and Amplifying Waves). SSRN Journal. doi:10.2139/ssrn.5223968.
15. ^Afshin Rashid. (2024). Review of: "Investigating the performance of (C۶۰ and C۷۰ endohistal bucky tubes and nano-fullers) and diamond in the manufacture of nano-electronic devices". Qeios. doi:10.32388/i6e9rc.
16. ^Afshin Rashid. (2024). Review of: "Normally, the length of nanowires is more than 1000 times greater than their diameter. This huge difference in ratio (length to diameter) compared to nanowires is often referred to as ۱D materials". Qeios. doi:10.32388/xapduf.
17. ^Afshin Rashid. (2024). Review of: "Nano Fullerenes with The Ability to Store Electrostatic Energy That can be Used as Nano Supercapacitors With Very High Capacity". Qeios. doi:10.32388/0ubhl5.
18. ^Afshin Rashid. (2024). Review of: "Micro and nano-electromechanical systems (MEMS / NEMS) are devices in which the physical motion of a micro- or nano-scale structure is controlled by an electronic circuit". Qeios. doi:10.32388/2zjn6h.
19. ^Afshin Rashid. (2024). Review of: "Production of nano supercapacitors using nanoparticles (a piezoelectric and ferroelectric material)". Qeios. doi:10.32388/c2juls.
20. ^Afshin Rashid. (2024). Review of: "_ Lindemann's change structure section in electrical nanostructures Lindemann change / (change structure) in multilayer nanostructures". Qeios. doi:10.32388/ttqb0i.
21. ^Afshin Rashid. (2024). <div> Scanning Tunneling Microscope (STM) or Scanning Probe Nano Lithography or (SPL) in the Range (Below 20 Nanometers) </div>. SSRN Journal. doi:10.2139/ssrn.4973950.
22. ^Afshin Rashid. (2024). Nano Uorescences and their Application in Various Elds such as Nano Electronic Applications (Making Nano Electrodes used in Certain Electrical Circuits, Nano Photonics). SSRN Journal. doi:10.2139/ssrn.4973937.
23. ^Afshin Rashid. (2024). <div> Nano Carbon Atoms Of a Nano Graphitic Sheet (Graphene) Form a Planar Lattice Network </div>. SSRN Journal. doi:10.2139/ssrn.4970207.

24. ^Afshin Rashid. (2024). Nano Lasers (Continuous Waves or CW) Structure and Function. SSRN Journal. doi:10.2139/ssrn.4968495.
25. ^Afshin Rashid. (2024). Investigating the Nanotechnology of Electromagnetic Irrigation in the Nano-Agricultural System. SSRN Journal. doi:10.2139/ssrn.4968171.
26. ^Afshin Rashid. (2024). Atomic Force Nano Microscope (AFM) is One of the Optical Devices. SSRN Journal. doi:10.2139/ssrn.4968503.
27. ^Afshin Rashid. (2024). Review of: "A combination of interference nanolithography and nanoelectronics lithography enables the fabrication and reproduction of high-resolution structures in large areas". Qeios. doi:10.32388/qy3s52.
28. ^Afshin Rashid. (2024). Review of: "distribution of nanotubes by NIR-vis-UV absorption spectroscopyresulting in preparation like valence electrons (dopingP)". Qeios. doi:10.32388/jg6x41.
29. ^Afshin Rashid. (2024). Review of: "Production of nano supercapacitors using nanoparticles (a piezoelectric and ferroelectric material)". Qeios. doi:10.32388/c2juls.
30. ^Afshin Rashid. (2026). Review of: "(Nano Telecommunication) Flow Generation by Rectenna Nano Method". doi:10.32388/o26205.
31. ^Afshin Rashid. (2026). Review of: "Nano Antennas and Many Properties (Radiation Pattern Characteristics, Radiation Resistance and Reactance)". doi:10.32388/umseyn.
32. ^Afshin Rashid. (2026). Review of: "Microstrip Antennas are Popular for Low Profile Applications at Frequencies Above 100 MHz". doi:10.32388/g1hlz1.
33. ^Afshin Rashid. (2026). Review of: "The Application of Nanoantennas in Various Fields, including Nanosensors, Nanocommunication Networks, Electrical Energy Generation, and other Similar Topics". doi:10.32388/yvahwa.
34. ^Afshin Rashid. (2025). Review of: "Carbon Nanotube-Based Nanocommunications Devices Demonstrate The Possibility of identifying individual Molecules Through Their Unique Noise Particles in Current Nanocommunications Signals". doi:10.32388/e6q55k.
35. ^Afshin Rashid. (2025). Review of: "The (HAARP) Electromagnetic system is designed to have a direct effect on the ionosphere. Examples of these effects include reddening, melting, or magnifying the layer". doi:10.32388/6ygs11.
36. ^Afshin Rashid. (2025). Review of: "(Nanocommunications) Using Acoustic Signals to Detect Molecular Activity ((interaction) or (Active Orbital)) of interest". doi:10.32388/eb1wgb.

Attachments: available at https://doi.org/10.32388/UOM6VO

Declarations

Potential competing interests: No potential competing interests to declare.