Investigating the electrostatic interaction of graphene nanoparticles in the supermolecular simulation process of the pie (conjugated) structure

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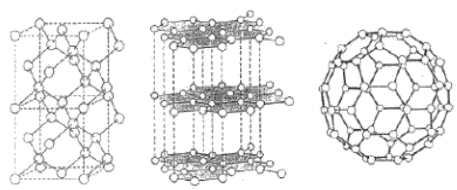
- **Abstract:**

- Graphene nanoparticles, due to their high electrical properties, as well as the abundance of their main component i.e. graphite in nature, are considered a suitable alternative to carbon nanotubes in order to produce electronic nanostructures.

- **Keywords :** Graphene nanoparticles , nanoparticles , carbon nanotubes , nanostructures

Introduction •

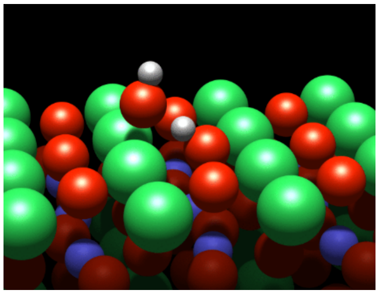
On the other hand, due to the unique properties of graphene, including nano-electrical , nano-electrochemical properties and high specific surface area, the ability to use this material in many applications such as sensors, nano-transistors, energy storage sources and all kinds of nano-devices Microelectronics has grown dramatically. Graphene has significant nanoelectronic properties, including; high Young's modulus; High fracture strength , excellent nanoelectrical conductivity, fast movement of (nanobars) . There is a simple electrostatic interaction between graphene nanoparticles in a solution, graphene nanoparticles like semiconductors, nanotransistors. In terms of building blocks, graphene is fundamentally different from other two-dimensional or three-dimensional graphite materials and other geometric forms of carbon, such as zero-dimensional spherical fullerene. Graphene is made of one layer with one-dimensional carbon nanotubes from a hexagonal ring, which can be proposed as a supermolecule of aromatic planar conjugation. The planar structure of graphene has created an excellent ability to use this material in the field of transfer and electrostatic interaction in nano-electrical devices.



The application of graphene nano-ribbons in nano-interfering electromagnetic shielding materials and nano-electrostatic discharge in nano-electronic devices has expanded to Rectenna nano-antennas and nano-supercapacitors. The effectiveness of graphene particles in electromagnetic interference shielding and enhanced with modified graphene nanoribbons is measured. One of the important and new structures of carbon nanostructures is graphene. Graphene is a sheet of carbon atoms. Graphene is the newest member of the large carbon family. The term graphene was used to describe a single nano layer of graphite. This nano material has high transparency due to its small thickness. Also, its conductivity has caused it to attract a lot of attention. It is very difficult to control the conditions to separate a single layer of graphene, usually the prepared material called graphene consists of a set of several layers of graphene , each of which contains a different number of sheets.

Investigating the unique properties of nano- fullerenes (the third form of carbon and graphene) in nano-electronics •

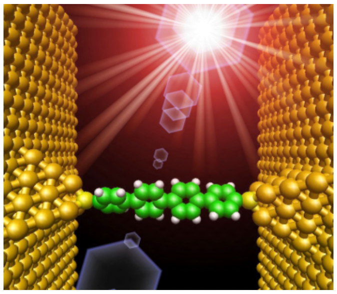
Fullerene is the third form of carbon along with graphite and diamond, which has unique properties and makes it suitable for current resistance in nanotransistors, organic nanophotovoltaics, nanosuperconductors and nanosensors. The unique properties of fullerenes enable a wide range of applications from nanoelectronics to medicine. Fullerenes can behave as superconductors through semiconductors and are exceptional radical transporters. Extreme durability, the property can easily be used in current transfer properties as a modified derivative, and this has caused changes in their electronic structure, solubility and physical properties (structure).



The structure of fullerenes in nature has five allotropes: diamond, graphite, nanotube, amorphous carbon and fullerene, all of which are solid. The base of fullerenes is the plates in graphite, with the difference that in the atomic structure of fullerenes, instead of regular hexagons in graphite plates, there is a series of regular hexagons and pentagons, which are placed side by side. have taken and formed the fullerene sphere. The placement of these pentagons and hexagons together is necessary to form a spherical structure. In fact, without the presence of pentagons in the graphene structure, spherical structures cannot be obtained from graphene sheets.

Electrically conductive graphene nanoribbons and mutation of multi-layered and single-layered nanotubes •

Electrically conductive graphene nano-ribbons in the structure of multi-layer and single-layer nanotubes show signs of ballistic transport . Although the electrical conductivity of graphene obtained using electrochemical methods is not as good as perfect graphene, it is still a suitable option for the production of electrically conductive graphene nanoribbons .



SWCNTs inside the carbon nanotubes are mixed with graphene conductive fillers to obtain conductive materials that are light in weight and have a minimum electrical resistance of less than 105 m/Ω. These graphene nanoribbons show a non-linear increase in the amount of electrical conductivity, which shows that this increase is a function of the amount of the reinforcing phase. At a certain value of the nanoparticle, which is known as the permeability threshold, the nanoparticle has the ability to form a network structure. This causes a sudden increase in electrical conductivity of graphene nanoribbons inside CNTs carbon nanotubes.The inherent conductivity and length-to-width ratio of carbon-based filler nanoparticles make them a suitable choice to reach this permeability threshold in small amounts of the filler phase of graphene nanoribbons inside CNTs nanotubes. Perfect graphene sheets show signs of ballistic transport . Although the electrical conductivity of graphene obtained by electrochemical methods is not as good as that of perfect graphene, it is still a suitable option for the production of electrically conductive graphene nanoribbons .The movement of nanoelectrons in electrochemically modified graphene nanoribbons is the result of carbon nanotubes, CNTs and graphene nanoribbons . Nano-electron conductivity in a sample of graphene nano-ribbons has been measured around 200 ± 2400 m/S . CNTs carbon nanotubes in combination with graphene nanoribbons in low percentages form the electrical permeability threshold. Also, graphene and modified graphene in the same amounts or even less than carbon nanotubes have the ability to form a conductive network and nanoelectron transfer , the acoustic threshold changes in a wide range of composition percentage of graphene nanoribbons .

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