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Atomic Structure and Binding of Carbon Atoms

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Abstract –Many studies deal synthesis of carbon materials and for different states (allotropic forms) of carbon atoms, also. In carbon atom, a non-conservative energy but in certain shape is required to transfer the occupied state electron to nearby unfilled state where also a non-conservative force is invited to deal neutral behavior for that instant. This result into originates a new physical behavior of that carbon atom. The electron-dynamics remain non-confined for different states of carbon atoms and not the case as for silicon atom. This study describes the formation of atomic structure of different states carbon atoms following by binding mechanism of each identical state atoms. Evolution of graphite structure is one-dimensional when amalgamating atom executes non-confined electron-dynamics for gaining stable state at the instant of binding to attained same stable state atom. Evolution of graphitic state atoms is two-dimensional when amalgamated atoms bind under appreciable attained dynamics where opposite forces of surface format are at opposite sides of each atom and if they are not kept bound under the least force difference, they also not keep them separating once amalgamated. Structural evolution is two-dimensional for nanotube and four-dimensional for fullerene where different shapes binding energies of atoms invite forces to be neutral at the instant of binding atoms, which are mainly related to surface format. Structural evolutions of diamond and lonsdaleite are under the joint application of surface format force and grounded format force, which are invited to be neutral under the binding energies shape-like tilted J or opposite of tilted J. Structural evolution of graphene involves both surface format and space format forces to work neutral at the instant of binding atoms where binding energy of the atoms is in the shape of inverted tilted J or opposite of inverted tilted J. Glassy carbon is related to wholly layered-topological structure where tri-layers of gas carbon atoms, graphitic state atoms and lonsdaleite state atoms order in repetition manner. In glassy carbon, forces of space format, surface format and grounded format work as neutral while binding atoms under energies shape-like tilted J (and opposite of tilted J) and inverted tilted

J (and opposite of inverted tilted J). Growth of diamond is south to ground but binding of atoms is ground to south, so it is tetra-dimensional topological ground to south structure. Same is the case for lonsdaleite state atoms but bi-dimensional topological ground to south structure. Growth of graphene is ground to north but binding of atoms is north to ground, so it is tetra-dimensional topological north to ground structure. Due to maintenance of electrons at above ground surface having no specific ground point, gas state carbon atoms do not bind. Hardness of carbon materials, based on the available literature, identifying exploring levitation-gravitation behaviors of electrons in different state carbon atoms is sketched. A carbon atom is a best model to explain binding mechanism in atoms of various elements and when in fullerene state, it is a best model to understand the working forces at ground surface.

Keywords: Carbon; Atomic structure; Atomic behavior; Atomic binding; Force-energy behaviors; Diamond; Nanotube; Fullerene; Glassy carbon

1.0 Introduction

Developing selective size and shape materials and investigating their characteristics at the outlets of forefronts of applications solicit new sort of approaches and observations. Wherever forces or ground energies influence the process of evolving structure, energy or force is being anticipated either for their conservation or non-conservation, respectively. Inviting energy or force under the involvement of different sorts of forces or energies working at different levels depend on the nature of atoms processing for certain application material. When carbon atoms of gas state are converted into certain state of established physical behavior, they are to be anticipated for evolving structure under attained dynamics and non-confined electron-dynamics as it is regulated under the possible chain of command of energy instead force. Such naturally originated approaches based on the multidisciplinary view may result into originate understandings to understand atomic natures and their behavior very differently to the standing ones. More specifically, understanding the mechanism of evolving structure based on the different state carbon atoms relying on the same chemistry at input end. But, it has been shown differently in different spectroscopic analyses as given elsewhere [1] because of dealing different peaks of wave number and energy for different state carbon atoms in ‘tiny grains carbon films’ where the input source was the gas carbon atoms. Additionally, depending on the process conditions and employed technique, source gas carbon atoms work for the evolution of different morphology-structure of tiny grains, grains and crystallites where that would switch into different morphology-structure under the minor fluctuation of the parameters [2]. Again, different morphology of grains and crystallites was observed at different chamber pressure identifying role of energy on their evolution for each resident chamber pressure [3]. Moreover, it has been discussed that both deposition of graphite and diamond, in distinctive manner, at single substrate is under the differently set inter-wire distance of dissociating gases [4].

Atoms of carbon in different allotropic forms (states) have their different history more possibly starting from the gas state, graphitic state and diamond state, then, lonsdaleite and fullerene following by carbon nanotube and glass carbon and recently graphene. Several studies on carbon materials are available in the literature explaining the deposition, morphology, growth rate, quality, application, etc.

It is necessary to understand dynamics of tiny particles’ formation prior to go for assembling into large size particles [5]. Agglomerations of colloidal matter envisage atoms and molecules to deal them as materials for tomorrow [6]. Formation of different tiny particles has been discussed elsewhere [7]. The formation mechanism of tiny shaped particles under certain concentration of gold precursor has been discussed [8]. Under identical process parameters, the nature of precursor directs tiny shaped particles following by large shaped particles where role of atomic nature is crucial [9]. Different tiny shaped particles were developed under the application of nano shape energy while varying the bipolar pulse and pulse polarity [10]. Formation process of large-sized particles reveals very high development rate [11]. Basis structures of solid atoms under the application of confined (uniform) electron-dynamics while dealing the single format force (grounded, surface and space) have been discussed elsewhere [12]. Formation of monolayer tiny particle in gold under transition state of atoms involving forces of surface format elongate into structure of smooth elements as discussed elsewhere [13]. Atoms of suitable elements executing electronic transitions don’t ionize, deform or elongate while inert gas atoms split under the application of photonic current [14]. The phenomena of heat and photon energy have been discussed while dealing silicon atom where inter-state dynamics of neutral state electron configure heat energy into forcing energy (photons) characteristic current [15]. Atoms of tiny particles of certain nature deal different behaviors resulting into work as either effective nanomedicine or defective [16]. A detailed study has been presented elsewhere [17] where the origin of atoms to be in different states along with their force-energy paradigms is discussed. Predictor packing in developing particles of unprecedented shapes under force-energy behaviors is discussed elsewhere [18].

Atoms of different elements are to be recognized on their physical attributes and their structures are also considered to be based on the physical attribute. Carbon atoms deal several physical behaviors even though it is being declared with unique chemical nature. Carbon materials comprised identical state atoms which reveal very different behavior with respect to each other which is being categorized at clear grounds. This indicates that transition (or transfer) of certain electron to nearby available unfilled state within the same ring change the nature of atom resulting into introduce a new phenomenon of its behavior. It is also being considered that force behavior along entering (north pole) and leaving (south pole) ground surface is different as compared to force behavior at/near ground surface (east-west poles), which is being observed in everyday life in addition to the available fundamental laws and scientific phenomena. This originates that each atom of the nature at its centre deals the axes where transition (transfer) of any electron under the crossing of north or south pole is prohibited and for which a detailed study is given elsewhere [17]. Thus, the available option for the transition (transfer) electron of filled state to unfilled state in all suitable atoms is being considered under the characteristic energies within left-side when are within west-pole of the atom and within right-side when are within east-pole of the atom where centre of each atom is being treated as a ground point in terms of existing forces as in the case of silicon atom when it is ready to configure photon energy (photon characteristic current) from the heat energy because, no mass was available at center of the atom to realize the working force. When the ground point of an atom is (just) at above ground surface, it is being dealt in gas state (or nearly in solid behavior) under dominating force of space format and when the ground point of an atom is (just) at below ground surface, it is being dealt in solid state under dominating force of grounded format. Evolution of different basis-structures in atoms of nearly solid behavior, healthy solid behavior and originally solid behavior at just above ground surface (varying ground surface level of different regions), at ground surface and at below ground surface, respectively, envisaging different format of forces as discussed elsewhere [12]. Again, deposited hard coatings on various materials, tools and substrates are because of the oppositely worked force-energy behaviors of atoms as discussed elsewhere [19].

Atomic binding in different state carbon atoms are remained challenging since the birth of carbon element and only partial information on evolution of graphite structure is available. Then, atom to atom binding when carbon is in diamond state where at one side, a large crystallite is growing and on the other side, a single atom of diamond state deposited on it to grow further. Then, structural evolution of other states of gas carbon atoms resulted on transferring electrons from filled to unfilled states under the application of characteristic energies. Then, evolution of structure comprised layers of certain state carbon atoms in repeated order. In the present work, atomic structure of different state carbon atoms is pinpointed. This study describes the science of different state carbon atoms and their structure evolution.

2.0 Results and discussion

A lattice of carbon atom is shown in Figure 1 (a) where central four unfilled states (of electrons) are related to zeroth ring or nucleus, whereas, covering eight unfilled states (of electrons) are related to outer ring or first ring of an atom. Twice pair of photons wavelength characteristic current when inter-crossed at common centre comprising each pair of four troughs and four crests, a space for eight electrons is formed by the eight circular hollow regions. When another twice pair of photons characteristic current inter-crossed at the same centre along north-south axes resulting into compress two states of each pair in opposite side because of already inter-crossed twice pair along east-west axes. This results into leave the circular hollow regions for only four states (electrons) as shown in the lattice of carbon atom (Figure 1a). As, both pairs inter-crossed while forming the place for twelve electrons under their maintained common centre and their centre is related to centre of carbon atom. Among twelve states of electrons four remained (outer ring) unfilled giving options to originate six different physical natures of the carbon atom in addition to the gas one. One more physical behavior is resulted when layers of certain different states carbon atoms bind. In each different state carbon atom, the central four electrons form the zeroth ring (or helium atom) and is termed as nucleus as discussed elsewhere [17]. In Figure 1 (b), a gas state carbon atom is shown. Other different states of the carbon atom are shown in Figure 1 (c-h) where changing certain position of electrons in the outer ring with respect to right-side and left-side along north-south poles result into originate a new state of the carbon atom; in Figure 1 (c) graphitic state, in Figure 1 (d) diamond state, in Figure 1 (e) lonsdaleite state, in Figure 1 (f) graphene state, in Figure 1 (g) nanotube state and in Figure 1 (h) fullerene state, respectively. In the gas behavior of carbon atom while in the process of changing the position of two electrons from filled state to nearby unfilled state, one from the right-side and second from the left-side for one state down, it is under the involvement of certain shape energy at both sides of the atom where relevant forces of electrons become neutral resulting into introduce a new state of that carbon atom namely, graphitic state. In the process of transferring all four electrons of outer ring into states available at downward side of east-west pole of carbon atom, a certain shape energy involved at both sides of the atom where again relevant forces of transferring electrons become neutral resulting into originate a new state of that carbon atom namely, diamond state. An occupied state of the electron or unoccupied state (position) in the atom is termed as 'state', whereas, based on newly occupied state of the electron in atom, it is also termed as 'state' where the atomic state, instead of electron state, originates a new physical behavior of that atom belonging to same carbon element. Depending on the gained position of electrons in their atom, the contraction and expansion of their clamping energy knots are to be adjusted accordingly and, then, relatively to the companion ones, also.

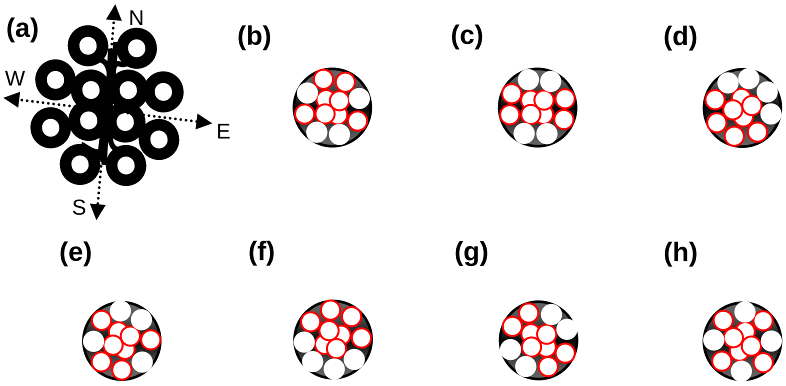

Figure 1: (a) lattice of carbon atom and atomic structure of carbon atom when in (b) gas state, (c) graphitic state, (d) diamond state, (e) lonsdaleite state, (f) graphene state, (g) nanotube state and

(h) fullerene state (bucky balls); red color circles denote filled and grey color circles denote unfilled states of electrons, which are drawn in estimation

When gas carbon atom converts into graphitic state, it is under the availability of energy shape-like half-parabola as transferred electrons maintained negligible force of grounded format and more force of surface format along east-west poles in terms of dealing their neutral behavior. However, on the transferring of necessitating electrons of graphitic state atom to lonsdaleite state atom, energy shape-like opposite of tilted J (along west to south) and energy shape-like tilted J (along east to south) are placed as transferred electrons maintained negligible force of surface format and more force of grounded format in terms of remaining in their neutral behavior. In conversion of lonsdaleite state carbon atom from graphitic state carbon atom, only two electrons followed those left-side and right-side placed characteristic energies. But, on conversion of diamond state carbon atom from lonsdaleite state carbon atom, further two electrons followed the placed characteristic energies at both left-side and right-side of the atom. At this instance, ground point of the diamond state carbon atom became further below to ground surface as compared to lonsdaleite state carbon atom, which attained ground point just at below ground surface. The energy of certain shape (half-parabola) in required number (two) utilized along the configured trajectory of transferring electrons while the conversion of gas carbon atom into graphitic state. However, transferring of all four electrons of outer ring toward south-pole where ground point of the carbon atom became fully grounded is called diamond state atom, thus, transferred electrons are dealing the maximum level expansion of clamping energy knots, which is being compensated by the companion ones.

In Figure 2 (a), binding of graphitic state atoms is shown; when one amalgamated atom is already in the graphitic state (atom A) and another atom (atom B) is in the transition state to achieve the graphitic state. At that instant, configured energy by the atoms B is being used to bind to the clamping energy knot of electron in adjacently placed atom (atom A). However, that energy (shape-like half-parabola) is given in advance to work as the trajectory of transferring electron where related forces of that electron (mainly surface format force and a bit grounded format force) remain neutral, thus, that atom is converted into graphitic state too. On binding of atom B to atom A under binding energy shape like half-parabola, they gained stable state where both have ground point at ground surface.

This results into the binding of another atom (atom C) under the similar mechanism as for the case of atom B, which is shown in Figure 2 (a). In the binding of graphitic state atoms, the major portion of energy is maintained under the neutral involvement of surface format force and only a small fraction of energy is maintained under the grounded format force when the electron transferred from top to adjacent pole (east or west). On binding of graphitic state atoms in one-dimensional structure, they deal stretching of energy knots clamping electron states along the force of influencing poles in tiny grains carbon film resulting into develop elongated graphite structure where each one-dimensional array of atoms is related to the structure of smooth element as discussed elsewhere [1].

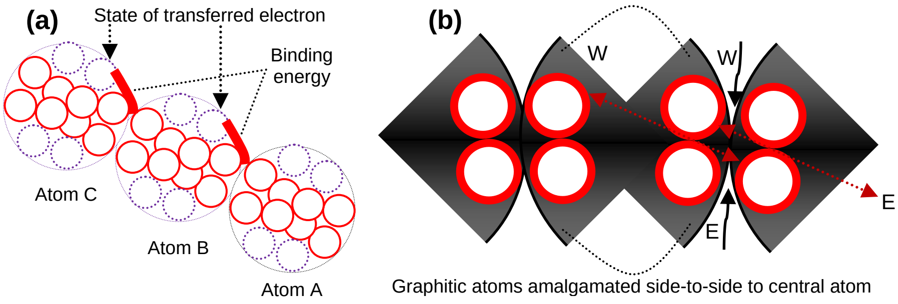

Figure 2: Structure evolution of graphitic state carbon atoms under the application of (a) non-confined electron-dynamics – a one-dimensional structure and (b) attained dynamics – a two-dimensional structure

When both atoms have been amalgamated under attained graphitic state, they bind under uniform attained dynamics to evolve structure. At this instance, the graphite structural evolution is two-dimensional instead of being one-dimensional. The binding energy shape like half-parabola is no longer available where binding of graphitic state is under only their attained dynamics as per difference of force of their east west poles. Because of the slight difference of east west forces at point of binding two graphitic state atoms, they remain bound only under attained dynamics as shown in Figure 2 (b); only the regions of paired electrons are shown dealing almost neutral force between opposite poles. Binding of atoms in graphitic state is prevailed at ground surface because of binding points of atoms rightly at adjacent, which results into evolve two-dimensional structure instead of one-dimensional but the morphology (shape) of the structure still looks like one-dimensional. This is the reason why graphite structure deals porosity and very low hardness under the involvement of different binding mechanisms of their atoms. Even though existing forces of opposite poles don’t work for a difference to allow binding of graphitic state atoms under their influence to translate two-dimensional structure, but, they at least don’t allow going atoms away from each other also where they amalgamated well in order under their attained dynamics. Graphite structure is remained to be maintained at suitable surface of the substrate where atoms distributed as per requirement of two-dimensional structure, thus, obeying the hierarchies of opposite poles originated for each amalgamated atom.

A lonsdaleite state atom ground point just at below ground surface is shown in Figure 3 (a), which is approaching to deposit (bind) to diamond state atom once conversion is made into diamond state as well. A diamond state carbon atom, which has already attained ground point at sufficiently below ground surface, is also shown in Figure 3 (a). The expected binding point of atoms when both in diamond state of binding is also labelled. In the nucleation of synthetic diamond, a deposited atom is at highly heated scratched seeded surface of solid which doesn’t enable the further attempting gravitation behavior of electrons because of giving the maximum potential energy to those electrons under the involvement of the relevant forces, therefore, no more expansion of clamping energy knots is taken place, so those electrons don’t further encroach the resting surface even to the extent of size (mass) of an electron, thus, they remain at hold in gentle way. Thus, that diamond atom is in full limit of solid behavior. Therefore, the ground point of diamond atom is at below to ground point of lonsdaleite state atom which is a bit below to ground surface. In this context, lonsdaleite state atom is in less expansion of clamping energy knots to filled and unfilled states as compared to ones in diamond state atom. The less and more expansion of clamped energy knots to filled and unfilled states in lonsdaleite and diamond state atoms can be drawn under the application of relevant software.

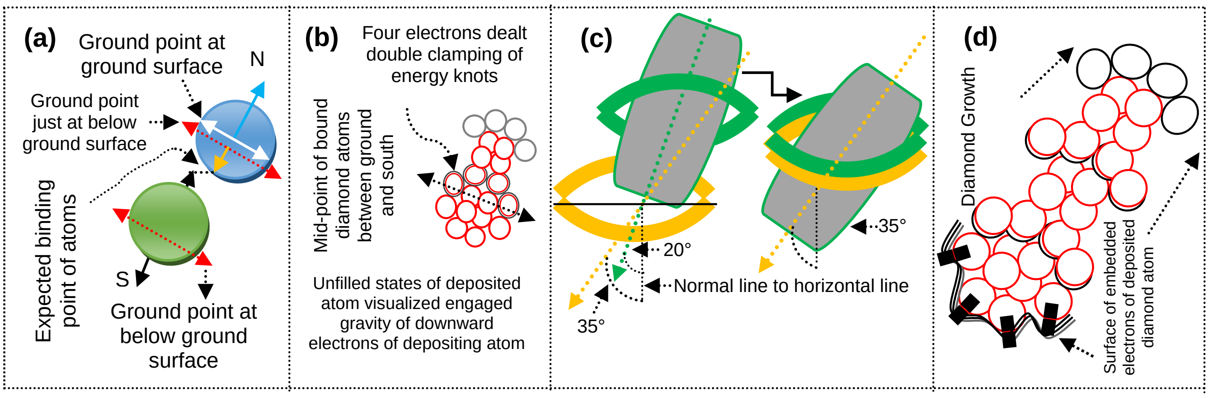

Figure 3: (a) ground points of lonsdaleite and diamond state atoms along with expected mid-point, (b) mid-point of two bound diamond state atoms on visualizing the gravity of electrons by underneath vacant energy knots where they dealt double clamping, (c) orientation of single electron of lonsdaleite state atom prior to deal conversion and orientation when they dealt conversion into diamond while remaining clamped to energy knots along with double clamping of energy knot to single electron of diamond state and (d) growth of diamond structure; circles in red color are related to filled states, in black color are related to unfilled states and in joint red-black are related to double clamping of energy knots to electrons drawn in estimation.

The ground point of lonsdaleite state atom is just at below ground surface because, it is underneath to ground point of graphitic state atom which is at ground surface. In diamond state atom, electrons introduced the maximum gravitation behavior where expansion of their clamped energy knots is also revealed at a maximum level. The resulted energy against the work done of electrons in diamond state atom dissipated enabling expansion of clamped energy knots at very much extended level. Tickling of electrons to clamped energy knots in lonsdaleite state atom is at less dominating level of potential energy resulting in their less extended level of expansion.

On transferring left two electrons to downward side unfilled states, below east-west poles, under the supply of two characteristic energies shape-like tilted J (from the right-side of atom) and shape-like opposite of tilted J (from the left-side of atom), a lonsdaleite state atom is also converted into diamond state atom. Now, electrons of that diamond atom (just converted one) also deal the same level of expansion of clamped energy knots as in the case of targeted (deposited) diamond state atom. But, just placed diamond atom on deposited diamond atom contains a bit different level of ground point resulting into turn all four electrons of downward side when their engaged gravity started visualizing to four unfilled states of underneath placed diamond atom. This will result into deal double clamping of underneath energy knots by those four electrons. On dealing the double clamping of energy knot in diamond state atoms, their binding comes into completion as shown in Figure 3 (b). On binding diamond state atoms, their combined filled and unfilled states along with zeroth rings adjust and compensate both expansion and contraction of clamping energy knots, thus, they together build combined ground point for the binding of next diamond state atom.

Lonsdaleite state atom deals contraction of clamping energy knots to electrons as compared to diamond state atom, which is related to recovery state of carbon

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atom where orientation of electron clamping energy knot constructs an angle of ~20° (including 5° due to tilted north-south poles with respect to east-west poles) to normal line (90°+20°=110°) and ground point is just at below ground surface. In line with this, expansion of diamond atom is under the electron constructing an angle of ~35° to normal line (90°+35°=125°) while remaining inside clamping energy knot and ground point is significantly at below ground surface (below to lonsdaleite state electron). Therefore, a single electron clamping by energy knot when in lonsdaleite state reveals an angle of ~ 20° to normal line just over the surface of unfilled state of diamond atom where once it converted into diamond state also dealt an angle of ~ 35° to normal line as shown in Figure 3 (c). An electron of diamond state when dealt double clamping of energy knot by forming an angle of ~35° from the normal is also shown Figure 3 (c), separately.

Overall behavior of diamond growth is shown in Figure 3 (d). In growth behavior, binding of diamond state atoms remained continue under the same mechanism on conversion of gas state carbon atoms where atoms adjust and compensate contraction and expansion of clamping energy knots to their electrons at each time of binding new atom. Therefore, in diamond binding, growth behavior is from south to ground where mid-point of ground point just at ground surface and at below ground surface is being explored in each time of binding diamond state atom to growing diamond structure. Therefore, the mechanism of double clamping of energy knots to electrons in binding diamond state atoms involved non-conservative energy where the invited non-conservative force in maintaining the binding also remained neutral. Rooted electrons at suitable substrate surface of first deposited diamond atom are also shown in Figure 3 (d) where they directed ground to south in the both sides of south-pole under the maximum attained expansion of clamping energy knots.

The mechanism of binding lonsdaleite state atoms obeys the identical process as in the case of binding of diamond state atoms. However, only two electrons of placed lonsdaleite state atom deal double clamping of energy knots of deposited lonsdaleite state atom. In this manner, one atom dealt the force of grounded format while the other atom dealt the force of surface format to be neutral locating their new joint ground point, which is a mid-point related to their binding. Therefore, binding in lonsdaleite state atoms is ground to south but growth behavior is south to ground. The involved characteristic energy is also in the same shape as for diamond but only for two electrons to bind each lonsdaleite state atom.

The ground point of graphene state atom doesn't lie at ground surface (or just at ground surface) but it lies just at above ground surface. Therefore, graphene state atoms involve contraction of clamping energy knots under the tickling of their electrons where the levitation behavior is at pronounced level. Binding of graphene state atoms includes surface format force and space format force to be neutral where they locate their new ground point. Two graphene state atoms bind at newly located ground point called mid-point. Therefore, in graphene structure, the binding mechanism of atoms is opposite to the binding mechanism of atoms disclosed for diamond, hence, the binding of graphene atoms is north to ground, but growth of graphene structure is ground to north. This is the reason why graphene structure is based on only few layers as it is challenging to maintain the involved energy under neutral behavior of invited forces in thick layer.

A carbon atom of nanotube state grows structure under the engaged binding energy of atoms attaining the ground point of identical state atoms at upper east lower west surface or upper west lower east surface as shown in Figure 4 (a). Atoms of such states bind under the neutral behavior of force of surface format by involving a minute level of force either belonging to space format or grounded format because of the shape of engaged characteristic energy. In the carbon atom, transfer of electron to nearby unfilled state of the same quadrant at its both upper east lower west (or lower east upper west) is required to attain nanotube state where the energy is involved for each transition resulting into bind amalgamating atoms approaching under attained dynamics at both sides of the central atom as shown in Figure 4 (a). The energy is involved at each transfer of the electron where energy shape-like parabola bound two atoms as shown in red color at both poles of the atoms forming the overall shape of the characteristic energy like parabola as shown in Figure 4 (a). Therefore, the structural evolution of carbon atoms in nanotube state is two-dimensional. Because, binding of atoms in nanotube structure having two opposite quadrants of nearly plane surface form angle in the mid of quadrant nearly, in either way. The binding of nanotube atoms is because of the involvement of two electrons in each atom, thus, evolving the two-dimensional structure also but the overall shape of nanotube is more likely a one-dimensional structure as shown in Figure 4 (a).

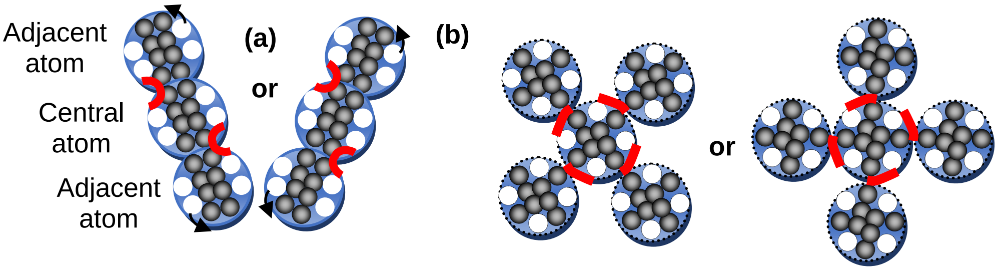

Figure 4: (a) nanotube structure– a two-dimensional structure where the engaged energy shape-like parabola between bound atoms in successive manner and (b) fullerene – a four-dimensional structure where the energy in half-parabola shape is being utilized to bind atom at mid of its each quadrant

When a carbon atom attains fullerene (buckyballs) state under the transfer of electron at each pole while engaging the energy shape-like half-parabola equally in all four quadrants of plane surface where mainly the force of surface format is involved for dealing the neutral behavior of each transferring electron along with the minute contribution of neutral forces of space format (in two quadrant) and grounded format (in two quadrant). A characteristic energy shape-like half-parabola while binding of identical state atoms at point of its each electron in outer ring is shown in Figure 4 (b) and binding in two options also. On attaining ground point while maintaining filled state one after the other that fullerene state results into bind four atoms depositing/amalgamating at appropriate attained-dynamics from all four quadrants of a nearly plane surface. The binding of four fullerene state carbon atoms with the central fullerene state carbon atom involves either upper west to west, west to lower west, lower east to east and east to upper east forces to keeps neutral for transferring electron to its certain state of each quadrant or west to upper west, lower west to west, east to lower east and upper east to east forces keeps neutral for transferring electron to its certain state of each quadrant. This indicates that structural evolution in fullerene state carbon atoms is four-dimensional where force of surface format is involved to be neutral including minute level of force of space format and grounded format to be neutral. Nucleation of fullerene state atomic binding in the basis-structure evolution is the best example to represent force of surface format working for nearly plane surface where atoms attain ground point just at the level of ground surface. Binding of atoms in fullerene structure involves all four quadrants of nearly plane surface forming angle either at nearly mid of each quadrant or at nearly along north-south poles and east-west poles.

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Glassy carbon involves all three formats of forces to be neutral to evolve its structure. Atoms of centre layer are in graphitic state. Repeated sequences of tri-layers (gas, graphitic and lonsdaleite state atoms) are involved in evolving structure of glassy carbon as shown in Figure 5 (a). Layers of gas and graphitic state atoms bind under the under the energy shape-like inverted tilted J while undertaking the joint application of grounded and surface format forces to be neutral resulting into deal double clamping of paired electrons. In a layer of gas state atoms, paired electrons of each atom deal double clamping of energy knots of paired unfilled states of graphitic state atoms in a layer under the adjustment of contraction and expansion of energy knots. The paired electrons of each gas state atom in the array deal double clamping of energy knots of each graphitic state atom in the array from the rear side while attempting forcefully the gravitation behavior under increased potential energy of the electrons. Layers of graphitic state atoms and lonsdaleite state atoms also bind under the energy shape-like tilted J while undertaking the joint application of surface and space format forces to be neutral resulting into deal double clamping of paired electrons. In a layer of lonsdaleite state atoms, paired electrons of each atom deal double clamping of energy knots of paired unfilled states of graphitic state atoms in a layer under the adjustment of contraction and expansion of energy knots. The paired electrons of each lonsdaleite state atom in the array deal double clamping of energy knots of each graphitic state atom in the array from the front side while attempting forcefully the levitation behavior under decreased potential energy of the electrons. Layer of lonsdaleite state atoms (layer C) and next layer of gas state atoms (layer A) deal the compensation in consecutive manner in terms of binding of each sequence of three layers as shown in Figure 5 (b).

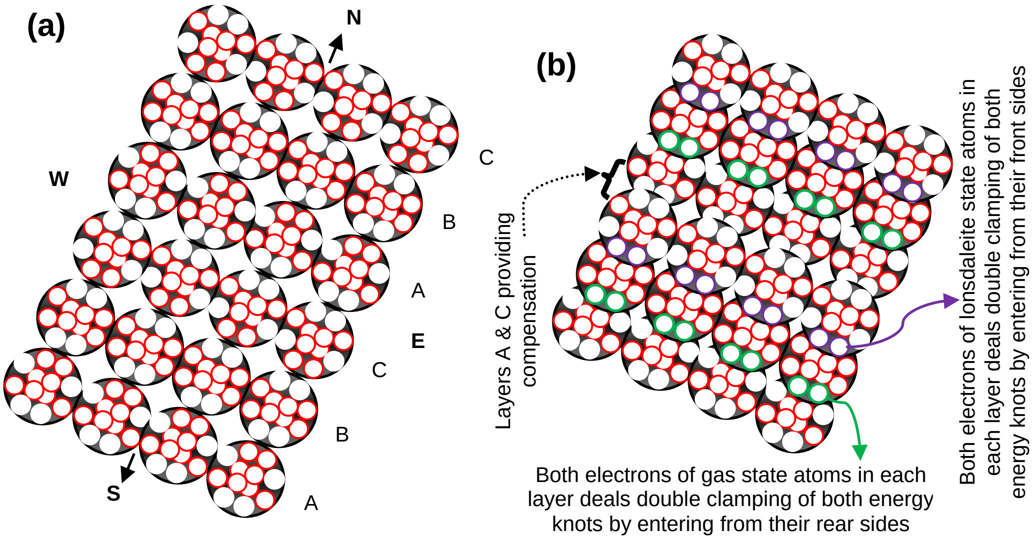

Figure 5: Structure evolution of glassy carbon involves three consecutive layers of atoms (a) gas state -layer A, graphitic state -layer B and lonsdaleite state -layer C and (b) binding of repeated tri-layers to evolve topological structure of glassy carbon

In evolving the topological structure of glassy carbon, compensation is being granted at each repetition of tri-layer because of overlapping of paired unfilled states of lonsdaleite atoms layer to paired unfilled states of gas atoms layer. The exact expansion and contraction of clamping energy knots to filled states and unfilled states while evolving the glassy carbon structure can be drawn under the application of relevant software. The binding mechanism of layers of different state carbon atoms involve forces of all three format and in reverse order where atoms of gas state layer are dealing grounded format force instead of space format force to be neutral while atoms of lonsdaleite state layer are dealing space format force to be neutral. However, atoms of graphitic state layer retain the ground point at ground surface, hence, provided the unperturbed surface for binding of upper and lower layers.

Atoms of carbon cover plane surface along with north and south depend on the occupied positions (orientations) of electrons in their lattice. The ground point of deposited diamond state atom doesn’t lie at ground surface or just at below ground surface, but it lies at below ground surface. Therefore, binding of diamond states atoms includes grounded format force as well as surface format force to be neutral to locate new combine ground point at each time of binding atoms, which is termed as mid-point. Therefore, structure of diamond is related to topological structure where characteristic energies involved to bind atoms while neutral behavior of grounded format and surface format forces. This again recalls that binding mechanism in diamond state atoms is ground to south where engaged energy to bind diamond state atoms has shape-like tilted J or opposite of tilted J or both, which are the characteristic binding energies for diamond. Structure of graphene is also related to topological structure where identical energy involved to bind atoms but in the inverted tilted J or opposite of inverted tilted J or both as growth is ground to north where forces of surface format and space format remained neutral to locate new mid-point of two binding atoms, every time. In the case of structure evolution of glassy carbon, characteristic energy shapes like tilted J (and opposite of tilted J) and inverted tilted J (and opposite of inverted tilted J) are involved. A hydrogen atom works only south to north or north to south without considering the plane surface (ground surface) as discussed elsewhere [17]. In simple sense, hydrogen atom transforms the photon energy to different heat energy, which are also discussed elsewhere [15] and they are called characteristic energies utilizing in binding carbon atoms of different state to evolve their structure.

The discussed characteristic energies in developing structures of different state carbon atoms are significant but they are not establishing by itself be like the shape of trajectory (gauge) because, electron-dynamics in all states of carbon atoms remain under the obligation of non-conservative energies where they engage non-conservative forces as well in securing transition of electrons and don’t let go them elsewhere at instant of transferring from filled to unfilled states. This is related to neutral behavior of the custody forces for those electrons when they are in line to follow trajectory (shape) of characteristic energy. A gauge relates to the trajectory of transferring electron from occupied state to nearby unfilled state under the placement of characteristic energy. The characteristic energies are drawn in estimation in the binding of different state carbon atoms, but, it is still not an exact statement because, electron of each state may deal a bit varied potential energy introducing a bit varied working force for it to be neutral resulting into a bit deformed expansion-contraction of clamping energy knot, which resulted into noncompliance of placed characteristic energy. Therefore, because of non-conservative behaviors of energy-force, that electron preferred to stay back within the occupied state under the first attempt to follow the trajectory of characteristic energy or even the second attempt to follow the trajectory of characteristic energy. So, the probability is still existed for electron to be not transferred into the unfilled state, in loop, hence, it doesn’t bind to atom which already attained the required state, because the distance of filled state electron to nearby unfilled state can't be justified by it with respect to its size (length) despite of that the required characteristic energy was there. This is because of the establishment of carbon atom by the nature. So, a carbon atom deals non-conservative energy through which non-conservative force is invited to work neutral while transferring electrons to originate different solid behavior state from gas state. Nonetheless, the characteristic energies are still characteristic energies for binding carbon atoms in their certain state.

Hardness at Mohs scale of atoms while dealing graphite structure and different originated atomic structures of the carbon at nanoscale is sketched in Figure 6. Zero value of hardness accounts in the case of atoms when nanoscale component of carbon atoms is in the gas state. The hardness of graphite structure and other different structures of carbon atoms at nanoscale is related to the gained potential energy under different levels of levitation-gravitation behaviors of electrons depending on the state of each comprised carbon atom as discussed above. Different value of wave number of printed intensity of energy signals from graphite structure and other different structures of carbon atoms at nanoscale in Raman spectroscopy reveal different trends of propagating photons under different position of electron states in their atoms as validated by energy loss spectroscopy also [1].

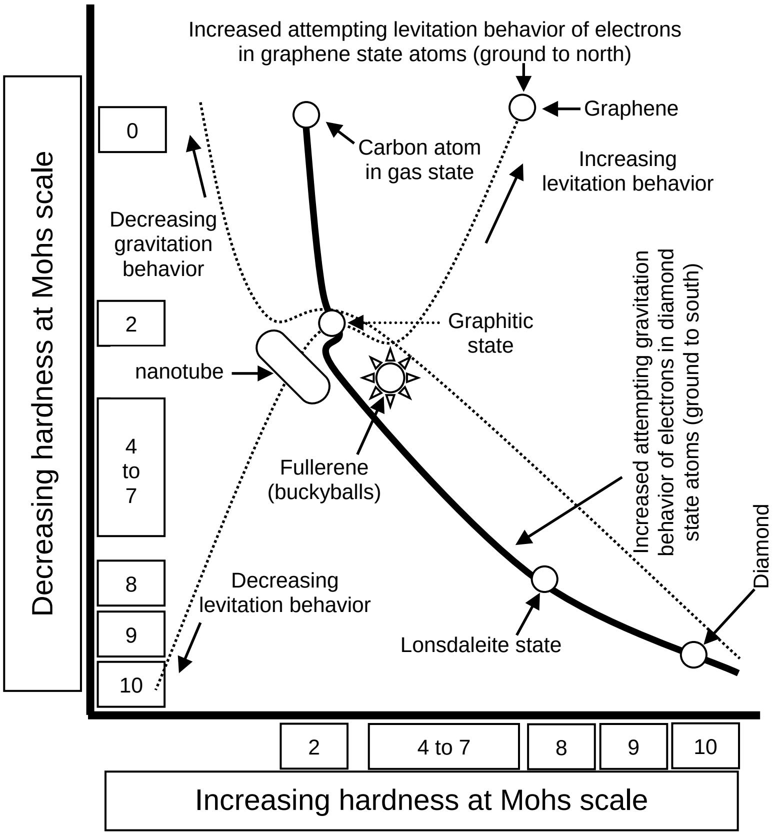

Figure 6: A sketch of approx. hardness (at Mohs scale) available in the literature for the structure of different carbon states (allotropic forms) versus dealt levitation-gravitation behaviors

Electrons of outer ring transfer to nearby unfilled states to originate different states of their carbon atom. In evolving structures of different state carbon atoms, the regulated binding energies, which are not conserved yet maintained the shape, are under sustained behavior of force-energy of transferring electrons for dedicated states attained just prior to transfer. Transferring electrons of filled states to unfilled ones in the carbon atom involves the non-conservative energy through which non-conservative force is engaged to keep neutral behavior till conversion of state of their atom or binding of atoms in their state. Transferring electrons under characteristic energies to unfilled states resulting into not only adjust expansion-contraction of their clamping energy knots but also the overall adjustment of expansion-contraction in their atoms while binding. Developing certain phase of structure in evolving structure of certain material is because of the engagement of different characteristic energies enjoying neutral behavior of force for electrons working to follow their trajectories. In this context, a content-specific growth of carbon films under varying chamber pressure has been discussed elsewhere [3].

The energy and force of an isolated atom is to be remained conserved. At the instant of binding carbon atoms in its any form of structure, involved force (in terms of its appearance) becomes neutral. But, it doesn't mean that the force is conserved (discrete). The characteristic energy can be varied (a bit) in its shape in the binding of identical state atoms. For each fixed shape of energy (discrete amount), involved forces not only behave neutral (in terms of their appearance) but are also be conserved (discrete). Because, even in the identical state binding atoms, the gauge of transferring electron can be varied a bit due to associated contraction-expansion of clamping energy knots.

But, in the case of silicon atom while transferring filled state electron to unfilled one, conservative forces are involved in inviting conservative energy as well, discussed elsewhere [15]. Because of the one additional filled ring of electrons around zeroth ring where neutral state electron of silicon atom exactly dealt forces of poles, in terms of their disappearance and appearance for specific instants, resulting into place (configure or shape) heat energy in a wave like fashion (photon energy). However, it is also discussed elsewhere [12] where electron of neutral state left for appearance of certain forces and retrieve the position back for the appearance of same forces but in opposite direction, exactly. So, they evolved different dimensional structures under the application of conservative force where neutral behavior of the forces does not entertain to bind atoms, because, binding energy was configured under the action of electron instead of characteristic energy, enabling (transferring) an electron from filled state to unfilled state under the neutral behavior of involved force. This indicates that distance of outer ring from the centre of an atom in various elements is the core in deciding what sort of the behavior is being involved to bind atoms of certain class of elements. Many existing discoveries are waiting, in the pipeline, and this is just the beginning, they are looking forward in exploring the class of grounded thoughts, unbiased views and dynamic approaches across the globe ready to be discovered.

3.0 Conclusions

In the carbon atom where two electrons of outer ring occupied states on north side and remaining two electrons of outer ring occupied states just below the line of east west poles at ground surface is related to gas state atom. In the carbon atom where two electrons of outer ring retain position in the states available at just above the line of east west poles and two electrons of outer ring retain position in the states available at just below the line of east west poles, it is related to graphitic state of carbon atom. In the carbon atom where all the electrons of outer ring retain position in states available at south side, it deals diamond state. Placement of certain characteristic energy results into transferring electrons of filled states to unfilled states enabling atom to originate new structure along with new physical behavior.

A graphite structure is evolved under the transfer of electron as well as under attained dynamics of graphitic state atoms, also. In the case of electron transfer, binding of carbon atoms deals one-dimensional evolution of structure. However, when amalgamating atoms have achieved graphitic state under their attained dynamics only, they bind dealing the difference of forces available at their adjacent ends is because of pair of electrons in each atom to its both sides resulting into two-dimensional evolution of structure. In one-dimensional graphitic structure, binding atoms is under the energy shape-like half-parabola where force related to surface format remains neutral, mainly. Carbon atoms while in nanotube state deals two-dimensional structural evolution where energy shape-like parabola bind atoms form both sides under the transferring of necessitating electrons. To nucleate fullerene structure, all four electrons equidistant from the centre involve placing energy shape like half-parabola for their transfer. In the evolution of nanotube structure, mainly the surface format is involved to remain neutral where forces of grounded format and space format remain neutral just for an instant. In the evolution of fullerene structure, mainly the surface format is involved to be neutral as well where force of grounded format in two quadrants and force of space format in two quadrants are also involved to remain neutral but just for an instant.

Binding of atoms in diamond state, all electrons of outer ring of depositing atom deal double clamping of energy knots of all unfilled states of outer ring of deposited atom where energy shape-like tilted J is involved in inviting the neutral force of grounded format and surface format along the trajectory. In binding of lonsdaleite state atoms, also the energy shape-like tilted J is involved in inviting the neutral force of grounded format and surface format but only for two electrons. In the case of binding atoms of graphene, a diamond like but opposite in description binding mechanism is involved where growth behavior is ground to north. Diamond structure is tetra-dimensional topological ground to south structure, lonsdaleite structure is bi-dimensional topological ground to south structure and graphene is tetra-dimensional topological north to ground structure.

Except two-dimensional structure of graphite, all structural evolution of carbon atoms while in certain state including the one-dimensional structure evolution of graphite and glassy carbon involve the neutral behavior of forces of all three formats because of already engaging energies shape-like inverted tilted J (and opposite of inverted tilted J) and tilted J (and opposite of tilted J). This validates that glassy carbon is related to fully topological structure. In the structure evolution of glassy carbon, the energy shape-like inverted tilted J and opposite of tilted J is placed from the bottom rear side and the energy shape-like tilted J and opposite of inverted tilted J is placed from the top front side. Binding atoms of each layer of lonsdaleite state to atoms of each layer of graphitic state is because of attempting forcefully levitation behavior of electrons due to their decreased potential energy; hence, the energy is placed from the top front side. Binding atoms of each layer of gas state to atoms of each layer of graphitic state is because of the attempting forcefully gravitation behavior of electrons due to their increased potential energy; hence, the energy is placed from the bottom rear side.

These investigations lead into present the origin of science and technology at clear grounds opening new areas of research on different lines as compared to the existing ones. These investigations enable us and others to understand different phenomena related to optics and photonics, inter-changeable paradigms of force-energy in different materials and light-matter interactions along with many others.

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