Atomic Structure and Binding of Carbon Atoms

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Abstract –Many studies deal synthesis of carbon because of its versatility but lack the arresting of understanding at convincing and compelling levels. Each carbon state atom explores its own science and application. To convert gas state carbon atom into graphitic state carbon atom, a non-conserved energy is required to transfer filled state electron to nearby unfilled state, on left-side and right-side. Forces of relevant poles at instant of transferring electrons behave neutral enabling each electron to obey arc-like trajectory formed by typical energy to go into nearby unfilled state. Changing the position of two electrons results into originate a new physical behavior of each established state carbon atom. Different state of the carbon atom is obtained under confined inter-state electron-dynamics where involved non-conserved energy engaged the non-conservative force. Involved energies in one-dimensional structure evolution of graphite engage neutral behavior of forces exerting in space format and surface format along the single axis. Involved energies in two-dimensional structure evolution of nanotube engage neutral behavior of forces exerting in space format-surface format and grounded format-surface format (and vice versa) along the two axes. Involved energies in four-dimensional structure evolution of fullerene engage neutral behavior of forces exerting in all four quadrants of binding each fullerene state atom. A graphite structure does evolve under attained dynamics of graphitic state atoms, only where opposite pole forces under a slight difference keep adhering the structure. Evolution of structure in diamond and lonsdaleite state atoms is under the joint application of surface format and grounded format where electrons of binding atom deal double clamping of energy knots belonging to unfilled states of deposited atom under their neutral behavior of exerting forces. Structural evolution of graphene is under the joint application of surface format and space format where four electrons of binding atom deal double clamping of energy knots belonging to unfilled states of deposited atoms under their neutral behavior of exerting forces. Growth of diamond is south to ground, but binding of

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diamond state atoms is ground to south, so, it is tetra-double-clamped energy knot ground to south topological structure. Same is the case for lonsdaleite state atoms except it is bi-double-clamped energy knot ground to south topological structure. Growth of graphene is north to ground, but binding of atoms is ground to north, so, it is tetra-double-clamped energy knot ground to north structure. Glassy carbon is related to a wholly layered-topological structure where tri-layers of gas carbon atoms, graphitic state atoms and lonsdaleite state atoms order in the repetition manner. In glassy carbon, forces of all formats (space, surface and grounded) work neutral while binding atoms under their successive tri-layers. Gas state carbon atoms do not evolve structure due to maintenance of electrons at above ground. Different states carbon atoms also evolve different amorphous structures when bind under their frustrating amalgamation. Hardness of carbon-based materials identified in literature is sketched in the light of different force-energy behaviors of different state carbon atoms. A carbon atom is the best model to explain binding mechanism in atoms.

Keywords: Carbon; Atomic structure; Force-energy behaviors; Atomic binding; Structure evolution; 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 involve the process of evolving structure under the engagement of characteristic energy or wherever characteristic energies involve the process of evolving structure under the engagement of neutral force behavior, the inter-state electron-dynamics of atoms evolving structure should be considered, their force and energy is to be considered in the mode of conservation for the first case and in the mode of non-conservation in the latter case. Engagement/involvement of characteristic energies and different format force is to be considered as per nature of atoms (built-in gauge of inter-state electron-dynamics) processing for evolution of different class structures having certain impact for targeted application. 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 electron-dynamics as well under the possible chain of command of energy first instead of force first. However, conservative forces are introduced in neutral state

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silicon atom for executing confined inter-state electron-dynamics where energy in the form of forcing energy is configured by the configuring trajectory [1]. This is because the built-in gauge of electron-dynamics in a carbon atom is different as compared to silicon atom despite of the fact that the same number of filled states and unfilled states are available in their outer ring. But the distance of each electron of outer ring from the centre of its atom is different in the case of carbon and silicon [2]. Such naturally originated approaches based on the multidisciplinary point of view may result into originate understandings to understand a different atomic nature and their behavior very differently to the standing ones. Nevertheless, atoms of confined inter-state dynamics of electrons under conservative forces engaged the conserved energy as well placing along their configuring trajectories as discussed elsewhere [3]. It is also essential to know that, prior to study atomic structure of carbon and binding of the different state atoms, atoms of the none of the element are ionized and electrons remain arrested by clamped energy knots in their atoms [4]; an electron is only transferred to a nearby unfilled state of the same atom by following the certain mechanism as per built-in gauge. Understanding the mechanism of evolving structure based on the different state carbon atoms relying on the same chemistry at input end is essential. In different spectroscopic analyses [5], peaks of different wave number and energy for different state carbon atoms of tiny grain are resulted where the gas state carbon atoms remained the input source. Additionally, depending on the process conditions and employed technique, source of gas carbon atoms work for the evolution of different morphology and structure of tiny grains, grains and crystallites where that would switch into different morphology and structure under the minor fluctuation of the parameters [6]. 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 [7]. Moreover, it has been discussed that deposition of graphite and diamond, in distinctive manner, at single substrate is under the differently set inter-wire distance of dissociating gases [8].

Atoms of carbon in different states known in the allotropic forms, also, have 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, the graphene one. Several studies on carbon-based materials are available in the literature explaining the conditions of deposition and

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their resulted effects in the form of morphology, growth rate, quality and application, etc.

It is necessary to understand dynamics of development of tiny-sized particles prior to go for assembling into large-sized particles [9]. Agglomerations of colloidal matter envisage atoms and molecules to deal them as materials for tomorrow [10]. Developing of different features tiny-sized particles has been discussed elsewhere [11]. The developing mechanism of tiny-shaped particles under certain concentration of gold precursor has been discussed [12]. Under identical process parameters, the nature of precursor directs tiny shaped particles following by the development of their large-shaped particles where role of the required atomic nature is also in focus [13]. Different tiny-shaped particles following by large-sized particles were developed under the application of nano shape energy while varying the bipolar pulse and pulse polarity [14]. Developing large-sized particles reveals very high development rate [15]. Structure evolution in different dimension and format of solid atoms executing confined inter-state electron-dynamics where conservative forces involved to configure (engage) the binding energy has been discussed elsewhere [3]. Formation of monolayer tiny-shaped particle where gold atoms are in their certain transition state bind under the application of nano shape energy where converting one-dimensional arrays of atoms to structure of smooth elements [16]. Atoms of suitable elements executing electron transitions don't ionize, deform or elongate while inert gas atoms split under the application of photonic current [4]. The phenomena of heat and photon energy have been discussed where neutral state silicon atom was the intermediate component [1]. Certain nature atoms of tiny-sized particles undertake different behaviors resulting into work as either effective nanomedicine or defective [17]. A detailed study has been presented elsewhere [2] where the origin of atoms to be in different states along with their certain force-energy behaviors where original state to liquid and liquid to original state is discussed. Gold particles of unprecedented shapes have been developed under tailored conditions of controlled force-energy behaviors as 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 declared with unique chemical nature. Carbon materials comprised identical state atoms which indicate very different behavior with respect to each other which is categorized at clear

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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 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 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 of their atom is prohibited and for which a detailed study is given elsewhere [2]; but the electrons of atoms are entitled to cross their own poles forming at their middle under the certain transition states. Thus, the available option for the transition (transfer) electron of filled state to unfilled state in all suitable atoms is to be 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. The centre of each atom is to be treated as a reference point in terms of exerting forces of different poles of certain electron(s) of its outer most ring as discussed in the case of neutral state silicon atom [1]. When the ground point of an atom is at above ground surface, it is being recognized in the gas state where dominating force is to be considered due to space format. When the ground point of an atom is at below ground surface, it is being recognized in the solid state where dominating force is to be considered due to grounded format. When the ground point of an atom is at average-leveled ground surface, it is being recognized in the partially gas partially solid behavior where dominating force is to be considered due to surface format. Evolution of different dimension structures in atoms of nearly solid behavior, healthy solid behavior and originally solid behavior at just above ground surface, at ground surface and at below ground surface, respectively, envisage different format of forces as discussed elsewhere [3].

Atomic binding in different state carbon atoms is 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, origin of structure evolution in other carbon states atoms is also remained challenging. Then, evolution of structure comprised layers of certain state carbon atoms in a repeated order. In the present

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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 four unfilled states around the centre are related to zeroth ring or nucleus when filled with electrons, whereas, covering eight unfilled states (of electrons) are related to outer ring or first ring of an atom. Two pairs of overt photons wavelength characteristic current when inter-crossed at a common centre comprising each pair of four troughs and four crests, a space for eight electrons is formed by the eight circular hollow regions where their element of force remains intact. When two pairs of photons characteristic current inter-crossed at the same centre along north-south axes result into compress two states of each pair forming at opposite sides because of already inter-crossed double pair along east-west axes. This results into form 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 site (of clamping energy knots) for twelve electrons under their maintained common centre. Among twelve states of electrons, four form the zeroth ring, eight form the outer ring (first ring) in which four remained filled and four remained unfilled, thus, providing the option to originate six different state behaviors of that carbon atom in addition to the gas one. One more physical behavior is resulted when layers of certain different states carbon atoms bind in a successive manner. 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 [2]. 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. In the gas behavior of carbon atom while in the process of transferring 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 (window) down, it is under the involvement of energy shape-like built-in gauge of transferring electron at both sides of the atom where exertion of engaged forces of electrons remain neutral

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in their behavior resulting into exactly obey the trajectory of bound energy to energy knot clamped to filled state till the nearby energy knot clamped to unfilled state. This involved energy shape-like arc for one window transfer of the electron at both east-west sides of the atom enable transferring of electron from both sides introducing a new state of that carbon atom namely, graphitic state. In the process of transferring all four electrons of outer ring to unfilled states available below to east-west poles (central line) of carbon lattice in gas state carbon atom, three pairs of energy shape-like arc involved to transfer all four electrons of outer ring as three windows-operation executed in transferring those electrons to downward unfilled states directing toward the south. This results into introduce the diamond state behavior of that gas state carbon atom. Again, the behavior of exerting forces in transferring electrons to dedicated unfilled states to attain each dedicated state carbon atom is remained neutral, thus, they exactly followed the path provided by the involved arc-shape energy connected between filled state and unfilled 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' but here the atomic state, instead of electron state, originates a new physical behavior of that atom belonging to same carbon element. Depending on the attained position of electrons in atom, the contraction and expansion of clamped energy knots are to be adjusted accordingly and, then, relatively to the companion ones, also.

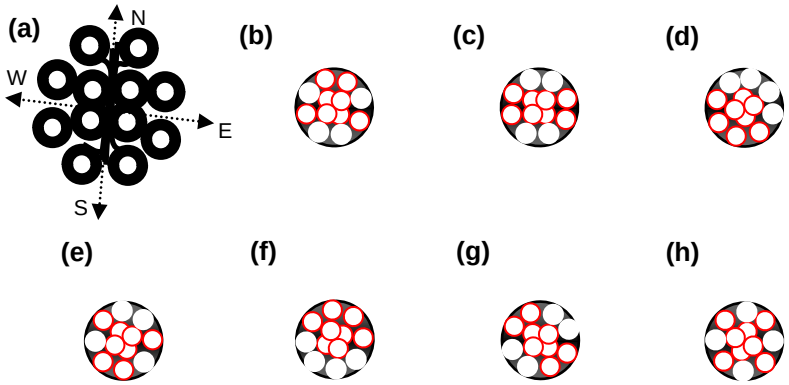

Figure 1: (a) lattice of carbon atom and atomic structure when in (b) gas state, (c) graphitic state, (d) diamond state, (e) lonsdaleite state, (f) graphene state, (g) nanotube state and (h) fullerene state; red colored circles denote filled states and grey colored circles denote unfilled, drawn in estimation

When gas state carbon atom is converted into graphitic state carbon atom, it is under the availability of energy shape-like arc to transfer the certain electron of left-side and right-side where transferred electrons engaged neutral behavior of exerting

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forces to them. The exerted forces are related to space format and surface format. However, transferring required electrons of graphitic state atom for lonsdaleite state atom, an energy shape-like arc along west to south and an energy shape-like arc along east to south is involved where transferring electrons from filled states to nearby unfilled states also engaged neutral behavior of exerting forces to them. This time exerted forces are related to surface format and grounded format. In conversion of lonsdaleite state atom from graphitic state atom, only two electrons followed those left-side and right-side involved typical energies. But, on conversion of diamond state atom from lonsdaleite state atom, two electrons further followed those left-side and right-side involved typical energies. At that instance, ground point of the diamond state atom became further below to ground surface as compared to lonsdaleite state carbon atom. Transferring of all four electrons of outer ring toward south-pole, two on left-side of south-pole and two on right-side of the south-pole, ground point of the carbon atom becomes fully grounded, which is related to diamond state atom. Thus, transferred electrons deal the maximum potential energy, which is being maintained under the exertion of orientating maximum gravitational force where clamped energy knots to electrons deal the maximum expansion also.

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, their involved energy is utilized to bind them, so they bound adjacently along the same axis. However, that energy was given in advance to work for the trajectory of transferring electron to attain the graphitic state where behavior of exerted forces (in space and surface format) is remained neutral, thus, that atom (atom B) bound (to atom A) at instant of just converting into graphitic state. On binding of atom B to atom A under binding energies shape-like arc, they evolve graphitic structure under the repetition of the same scheme as in their case. This results into the binding of another atom (atom C) under the similar mechanism as shown in Figure 2 (a). In the binding of graphitic state atoms, the involved energy is maintained under the neutral behavior of exerting forces in space format and surface format. The exertion of the neutral behavior of forces in space format and surface format while evolving structure of graphitic state carbon atoms remains along the same axis as shown in Figure 2 (a), so, structure is appeared to represent one-dimension only. Therefore, for structure evolution in graphitic state atoms under their executed electron-dynamics, the bindings of atoms

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are only adjacently where developing the one-dimensional structure. On binding of graphitic state atoms in one-dimensional structure and when they encounter parallel travelling photons (of suitably forcing energy) to them, they deal stretching of energy knots clamped electrons because of the exertion of existed forces of surface format, straight-forwardly, along their east-west poles. This results into uniform elongation of atoms from the centers. Elongation of graphitic state atoms from centers along opposite poles, where converting one-dimensional arrays of tiny grain to structure of smooth elements, is discussed elsewhere [5].

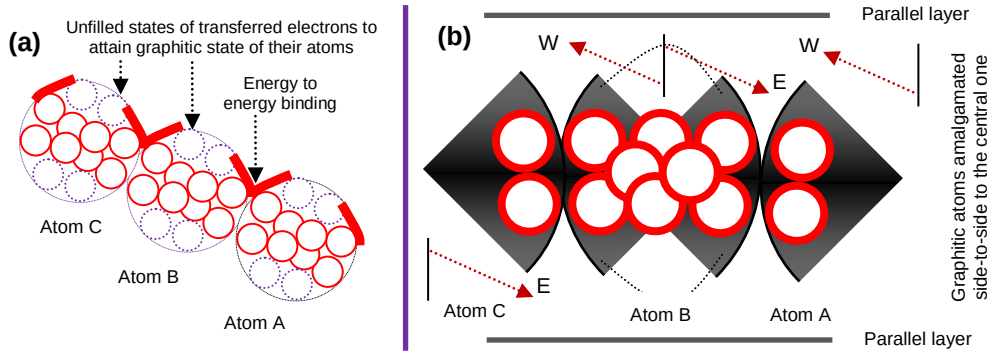

Figure 2: Structure evolution of graphitic state atoms under the application of (a) electron-dynamics – a one-dimensional structure and (b) attained dynamics – a two-dimensional structure

When both atoms amalgamated under their attained graphitic state, they only bound under their attained dynamics, thus, evolved structure without executing the electron-dynamics. At this instance, the evolution of graphite structure becomes two-dimensional. The binding energy shape-like nearly arc is no longer available where binding of graphitic state atoms is as per difference of available force between them. Because of the slight difference of exerting east-west forces at point of amalgamated two graphitic state atoms to central one, they remain bound only under attained dynamics as shown in Figure 2 (b). When identical layers of graphitic state atoms are evolved in parallel to, either upward-side or downward-side or both sides, the structure becomes two-dimensional as the force difference exerting along other poles of surface format also contribute, thus, keep holding the one-dimensional layers of graphitic state atoms for the two-dimensional structure. Even though existing forces of opposite poles don't work for an appreciable difference to allow binding of graphitic state atoms, but, they at least also don't allow atoms to go away from each other. But, when the surface of evolving graphite structure is not remained flat (at atomic level), the influences of exerting north-south forces are also included resulting into transform the evolving structure into amorphous graphitic structure.

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The evolution of amorphous structures may be considered in the case of other states of carbon atoms under such a scenario where frustrated attained dynamics of atoms can distort evolving structure of a certain state carbon atoms.

A lonsdaleite state atom having ground point just at below ground surface is shown in Figure 3 (a), which is approaching to deposit (bind) to diamond state atom once its conversion is in diamond state. 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 are binding in diamond state is also labelled. In the nucleation of synthetic diamond, a deposited atom is at highly heated scratched seeded surface of solid which doesn't allow it further to attempt gravitation behavior of electrons because of having the maximum potential energy for fixed oriented exerting force electrons, therefore, no more expansion of clamped energy knots takes place. So, those electrons don't further encroach the resting surface even to the extent of size (mass) of an electron resulting into maintain diamond state of their atom. 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 clamped energy knots to filled and unfilled states forming its lattice 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 dynamic application of relevant software. In Figure 3, sketches of different entities are drawn in estimation.

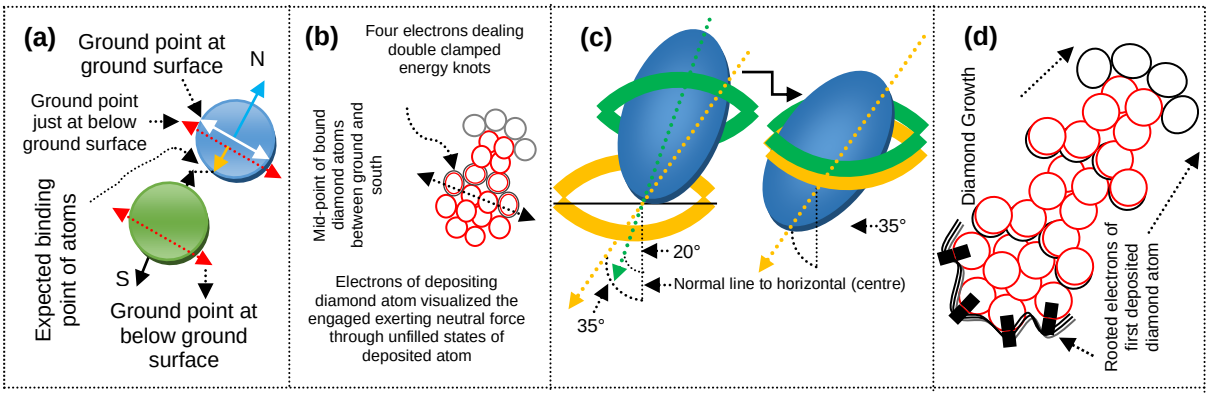

Figure 3: (a) ground points of lonsdaleite and diamond state atoms along with the expected binding point, (b) depositing diamond atom when it just binds deals double clamping of energy knots of its four electrons of south visualizing the engaged exerting neutral force of east-west poles and south-pole through rightly located above (and just inside) the four unfilled states of deposited diamond atom, (c)

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orientation of single electron of lonsdaleite state atom prior to deal conversion and orientation when it dealt conversion into diamond where it clamped by another energy knot related to the unfilled state of single electron of diamond state and (d) growth of diamond is south to ground; circles in red, black and red-black colors are related to filled states, unfilled states and electrons dealing double clamping of energy knots, respectively.

The ground point of lonsdaleite state atom is just at below ground surface because, it is underneath to ground point of graphitic state atom. In diamond state atom, electrons introduced the maximum gravitation behavior where expansion of their clamped energy knots is also appeared to be 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 a very much extended level. Electrons of lonsdaleite state atom deal orientational force at lower degree angle from the normal line of their centre resulting into possess lower amount of gained potential energy, hence, their clamped energy knots undertake less rate of expansion when compared to diamond state atom.

On the transfer of left two electrons to downward-side unfilled states, lonsdaleite state atom is converted into diamond state also. 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, on just grounding diamond atom on deposited diamond atom, a controlled expansion of clamped energy knots in both diamond state atoms are undertaken where taking the advantage of controlled (neutral) exerting orientational force of electrons under the nature of their fixed south-pole and east-west poles. This results into deal another clamping of energy knot by each electron of outer ring of depositing (binding) diamond state atom under the visualization of engaged neutral exerting force through the rightly located each unfilled state of outer ring of deposited (rooted/embedded) diamond state atom. Each electron of four filled states of outer ring in depositing diamond atom deals another clamp of each energy knot of four unfilled states of outer ring in deposited diamond atom results into the binding between those diamond state atoms as shown in Figure 3 (b). On binding diamond state atoms through certain electrons and unfilled states, 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 a new binding point for the following depositing diamond state atom.

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Lonsdaleite state atom deals less expansion of clamping energy knots to filled states of electrons and unfilled states of electrons as compared to the diamond state atom. Therefore, a lonsdaleite state atom is more related to the recovery state of a carbon atom where orientation of exerting force to each electron clamped by energy knot becomes ~20° angle from the normal line drawn from its centre (90°+20°=110°). Hence, in diamond state atom, expansion of clamped energy knot is under the exertion of force to electron constructing an angle of ~35° to normal line (90°+35°=125°). The orientational angles of exerting force to electrons of lonsdaleite state atom and diamond state atom from the normal line drawn at their centre are shown in Figure 3 (c). Electron of diamond state when dealt double clamping of energy knot for binding to another diamond state atom 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 the conversion of gas state carbon atoms where atoms adjust and compensate contraction and expansion of clamping energy knots to their electrons each time while binding new atom. Therefore, in diamond binding, growth behavior is from south to ground where binding point of the atoms remains between ground surface and grounded surface. The mechanism of double clamping of energy knots to electrons in binding diamond state atoms involves non-conserved energy where it engages the non-conservative force to maintain binding. Embedded electrons to suitable surface of first deposited diamond atom are also shown in Figure 3 (d) where they were directed ground to south under the maximum expansion of clamped energy knots. Once, a just depositing diamond atom attain ground point at the surface of already deposited diamond atom, electrons of filled states rightly obey the forces to maintain the orientation and gained potential energy as per underneath available unfilled states of deposited diamond atom. The clamped energy knots to the orientated electrons of depositing diamond atom are already in their full expansion under the maximum gained potential energy of electrons. On joining to the deposited one to attain the ground point, the clamped energy knots of unfilled states along north-side deal adjustable expansion-contraction where they don't let go down the electrons of depositing atom and both atoms maintain/adjust expansion-contraction of clamped energy knots to filled and unfilled states where binding of

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atoms are taken place ground to south but growth behavior of diamond is south to ground as shown in Figure 3 (d).

When depositing diamond state atom reach over the deposited diamond state atom precisely, the force exertion to their electrons is already under two different ground points. So, under the neutral behavior of exerted forces of surface format and grounded format, electrons of (depositing atom), which will deal another clamp of energy knot (in each case) clamping each unfilled state of already deposited atom, are in equal force of east-west poles and south-pole where exerting force of north-pole no longer exists. Therefore, depositing diamond atom remain in settlement to keep pause filled state electrons of outer ring directing downward-side and until in line to unfilled states directing upward-side of outer ring in the deposited atom. At that instant, electrons of depositing diamond atom remain detained in their clamped energy knots. So, when the binding of third diamond state atom is in process, those electrons of second deposited atom are being detained by the unfilled states of first deposited atom to deal another clamping of energy knot to each of them. Double clamping to electrons become apprehend on adjusting the expansion-contraction of the lattice by those two atoms, which came into force just reaching third diamond state atom on their surface as it locates a new point of binding with respect to already bound two deposited diamond atoms. This will lead the growth process of diamond as shown in Figure 3 (d).

The mechanism of binding lonsdaleite state atoms obeys the identical process as in the case of binding of diamond state atoms. However, only two orientated electrons of 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 a 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 to bring gas state atom into lonsdaleite state atom is in the same shape as for diamond but because of two windows-operation of transferring electrons, it is in less amount (number).

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 undertake contraction of clamping energy knots under exertion of force of electrons where their levitation behavior is at pronounced level. Binding of graphene

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state atoms includes exerting neutral forces of surface format and space format while the binding of two atoms under the location of new ground point but from north to ground. Therefore, in graphene structure, the binding mechanism of atoms is opposite to the one disclosed for diamond, hence, the binding of graphene atoms is ground to north, but growth of graphene is north to ground. This is the reason why graphene structure is based on only few layers as it is challenging to maintain the neutral behavior of exerting forces for involved energy in evolving structure of thicker layer.

A nanotube state carbon atom converts from the fullerene state carbon atom prior to go for assembling where forces of relevant poles of transferring electrons remain neutral and only the involved energy transferred them to their dedicated unfilled states. In the nanotube state carbon atom, its upper-sided transferred electron engaged the exerted forces of space format and surface format to be neutral. In the nanotube state carbon atom, its lower-sided transferred electron engaged the exerted forces of grounded format and surface format to be neutral. A carbon atom of nanotube state evolves structure under the involvement of binding energy for atoms attaining the identical state at instant of amalgamating as shown in Figure 4 (a). Here, a fullerene state carbon atom comes into a nanotube state carbon atom on transferring electron to nearby unfilled state for each opposite quadrant. Atoms of such carbon state bind under the neutral behavior of exerting forces in surface format-space format in one quadrant and surface format-grounded format in the opposite quadrant (and vice versa). The energy shape-like arc is involved to regulate transfer of electron to the dedicated state one from south-side and one from north-side but in the opposite quadrants of their atom resulting into bind amalgamating atoms under the attained dynamics at both sides as shown in Figure 4 (a). Therefore, the structural evolution of carbon atoms in nanotube engages neutral behavior of exerting relevant forces at instant of transferring electrons of the dedicated filled states to the dedicated unfilled states. As the binding of atoms in nanotube structure have two opposite quadrants, in either way, the evolution of structure is related to two-dimensional, but the overall shape of nanotube is appeared in a one-dimensional structure as shown in two options of Figure 4 (a).

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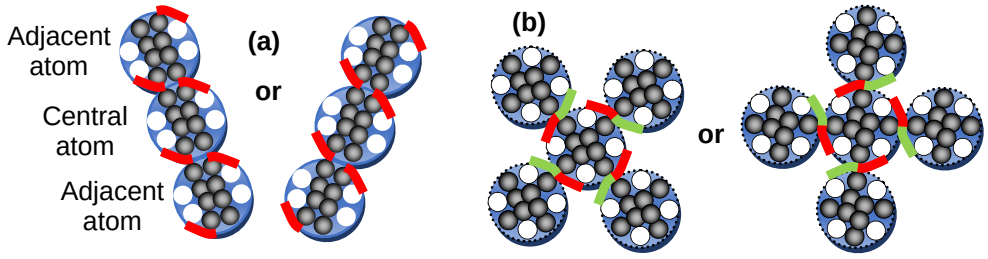

Figure 4: (a) nanotube structure– a two-dimensional structure where the involved energy shape-like arc in opposite quadrants of targeted atom bound atoms in a successive manner and (b) fullerene (buckyballs) –a four-dimensional structure where the energy shape-like arc is involved in each quadrant of targeted atom to bind four amalgamating atoms in each quadrant

When a carbon atom attains fullerene state under the transfer of electron at each dedicated state of pole while engaging the energy shape-like arc in all four quadrants where engaging mainly the exertion of neutral force in surface format at instant of transferring each electron. Here, a contribution of exerting neutral force of space format for two quadrants along with surface format and a contribution of exerting neutral force of grounded format for two quadrants along with surface format is to be considered. A characteristic energy shape-like arc while binding of identical state atoms at point of executing electron-dynamics is shown in Figure 4 (b); evolution of fullerene structure in two different ways is shown. This indicates that structural evolution in fullerene state carbon atoms is more like four-dimensional where force of surface format is engaged to be exerted neutral including forces of space format and grounded format. Binding of fullerene state atoms to evolve fullerene structure is in 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. A fullerene state carbon atom converts from the nanotube state carbon atom prior to go for assembling where forces of relevant poles of transferring electrons remain neutral and only the involved energy transferred them to their dedicated unfilled states. In the fullerene state carbon atom, its upper-sided transferred electrons engaged the exerted forces of space format and surface format to be neutral. In the fullerene state carbon atom, its lower-sided transferred electrons engaged the exerted forces of grounded format and surface format to be neutral.

In glassy carbon, all three formats of forces are engaged where they remain neutral in exerting at electron level, thus, enable binding of layers of three different state carbon atoms to evolve structure. Atoms of central layer are in graphitic state.

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Repeated sequences of tri-layers (gas, graphitic and lonsdaleite state atoms) are required to evolve structure of glassy carbon as shown in Figure 5 (a).

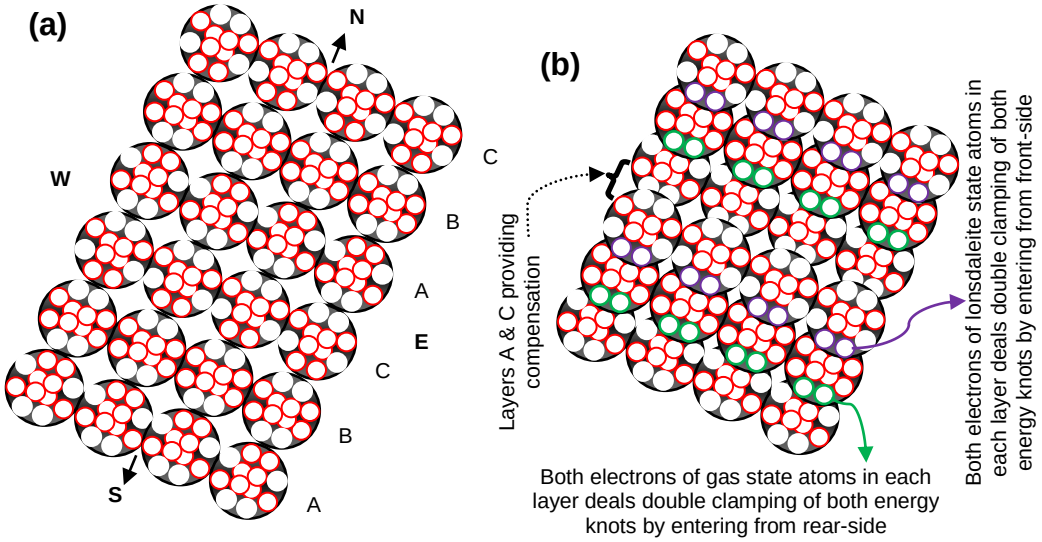

Figure 5: Structure evolution of glassy carbon when three consecutive layers of atoms (a) gas state -layer A, graphitic state -layer B and lonsdaleite state -layer C and (b) binding of repeated tri-layers to evolve topological structure of glassy carbon

Layers of gas and graphitic state atoms bind under the joint application of exerting neutral grounded and surface format forces resulting into deal double clamping of paired electrons. In the layer of gas state atoms paired electrons (paired unfilled states) of each atom deal double clamping of energy knots of paired unfilled states of each atom belonging to the layer of graphitic state atoms, which is under the adjustment of contraction and expansion of lattices of two different nature atoms arranged in the regular arrays. The paired electrons of each gas state atom (in the layer) deal double clamping of energy knots clamped paired unfilled states of each graphitic state atom (in the layer), which is from the rear-side as gas state atoms attempted forcefully the gravitation behavior under increased potential energy of their electrons. Layers of graphitic state atoms and lonsdaleite state atoms also bind under the joint application of exerting neutral surface and space format forces resulting into deal double clamping (for paired electrons of lonsdaleite state atoms). In the layer of lonsdaleite state atoms paired electrons (paired unfilled states) of each atom deal double clamping of energy knots of paired unfilled states of each atom belonging to the layer of graphitic state atoms, which is under the adjustment of contraction and expansion of lattices of two different nature atoms arranged in the regular arrays. The paired electrons of each lonsdaleite state atom (in the layer) deal

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double clamping of energy knots clamped paired unfilled states of each graphitic state atom (in the layer), which is from the front-side as lonsdaleite state atoms attempted forcefully the levitation behavior under decreased potential energy of their 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 each sequence of tri-layer as shown in Figure 5 (b).

In evolving topological structure of glassy carbon, compensation is granted at each repetition of tri-layer because of the overlapping of paired unfilled states of lonsdaleite atoms (north-side) to paired unfilled states of gas atoms (south-side). The exact expansion and contraction of clamping energy knots to filled states and unfilled states while evolving of glassy carbon structure can be drawn under the application of relevant software. The binding mechanism of layers of different state carbon atoms engage forces of all three formats. At electron level, atoms of gas state layer deal neutral behavior of exerting forces in grounded format and surface format (instead of space format and surface format), which is in the opposite order. At electron level, atoms of lonsdaleite state layer deal neutral behavior of exerting forces in space format and surface format (instead of grounded format and surface format), which is also in the opposite order. However, atoms of graphitic state layer retain the ground point at ground surface, hence, provided the concerted space to upper layer (lonsdaleite state atoms) and lower layer (gas state atoms) for binding.

The typical energy in developing structure of different state carbon atoms is significant but it is not established by itself to be like the shape of trajectory (built-in gauge of electron-dynamics) because, electron-dynamics for different state's transferring of a carbon atom remain under the obligation of non-conservative forces as their exertions under neutral behaviors were being engaged by the involved non-conserved energies. Therefore, involved energies don't let go transferring electrons other than their dedicated states. That's why, it has been disclosed that none of atoms ionize [4]. This is related to neutral behavior of the engaged forces for those electrons when they are in line to follow trajectory (shape) of characteristic energy already linked (connected) to the established path. The involved typical energies are drawn in estimation for binding of different state carbon atoms, but, they are yet not conserved because, electron of each state may deal a bit varied potential energy introducing a bit varied exerting neutral behavior force for it and then another minute neutral behavior exerting force is also involved as the typical energy is not in the

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shape of straight line resulting into a bit difference in the expansion-contraction of lattice (including clamped energy knots of unfilled state and filled state of transferring electron). Because of the non-conserved energy and exerting non-conservative force of that electron, it maintains attained state of atom till another typical energy is not involved also engaging the neutral behavior of exerting non-conservative forces. Under neutral state of an atom, it deals equal force of east-west poles and equal force of north-south poles for all electrons clamped by their energy knots [1].

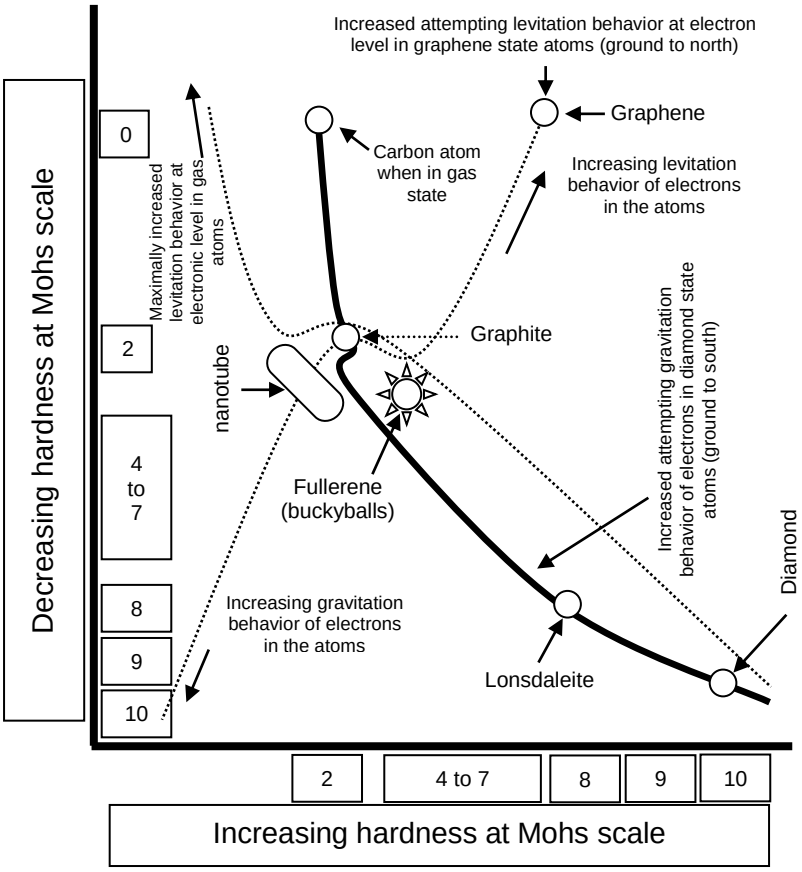

Figure 6: A sketch of approx. hardness (at Mohs scale) described in the literature for structures of different allotropic forms of carbon versus exerted levitational-gravitational force at electron level

Hardness at Mohs scale when graphite structure is evolved and other structures of different state carbon atoms at nanoscale are sketched in Figure 6. Zero value (nil) of the hardness accounts in the case of atoms when carbon atoms are in the gas state. The hardness of graphite structure and other structures of different state carbon atoms at nanoscale is related to the gained potential energy of their electrons under different levels of exerted levitational and gravitational forces, which are different for each established of carbon atoms as discussed above. In Raman spectroscopy, different values of wave number printed against energy signals of graphite structure and other structures of carbon (at nanoscale) reveal different

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nature of propagating photons through inter-state electron gaps of attained different state carbon atoms as validated by energy loss spectroscopy also [5].

In carbon, electrons of outer ring transfer to nearby unfilled states to originate different states of their atoms. Transferring electrons of filled states to unfilled ones in the carbon atom involves the non-conserved energy through which non-conservative force is engaged which remains exerting under neutral behavior till the conversion of state of that atom. Where that involved energy in transferring electron for its each dedicated state also work out to bind another amalgamated atom of identical state if the relevant exerting forces remain neutral. On binding identical state atoms, they adjust expansion-contraction of their lattices. The energy and force of an isolated atom belonging to any element (when in original state behavior) is to be remained conserved [2]. At the instant of binding carbon atoms to evolve any phase of its structure, engaged forces are required to work neutral. But, it doesn't mean that the exerting forces are conservative. The involved typical energies to attain different states of carbon atoms along with binding of carbon atoms are a bit varied in their features. For carbon element, only gas state atom presents its established state maintaining the conserved energy and force. So, for all dedicated transition states originating the new physical behaviors of different state carbon atoms, they involved both energy and force at a non-conserved scale.

Wherever, the non-conservative forces engaged to address the dynamics of electrons in certain nature atoms, they are as per the involved non-conserved energies. Therefore, the involved typical energies regulate the dynamics of electrons in various states carbon atoms where they engage the non-conservative forces, on invitation. However, wherever, the conservative forces involved to address the dynamics of electrons in certain nature atoms, they engaged the conserved configuring energy along the trajectory as well. As in the case of neutral state silicon atom where a filled state electron is transferred to nearby unfilled state on exerting the conservative forces along relevant poles engaging (or configuring or placing) the conserved energy as discussed elsewhere [1]. Because of the one additional filled ring of electrons around zeroth ring where electrons of a neutral state 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). In the case of neutral state germanium atom, configured photon energy of exerting force electron is to be considered under lower heat energy

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as compared to the one when in a neutral state silicon atom; distance from the centre of atom (germanium) is large for the electron executed dynamics as compared to distance of electron (executed dynamics) from the centre of silicon atom. This indicates that atomic size (radius) of different elements is the core in deciding what sort of the force-energy behavior is considered to bind (and study) atoms of different class. Structure of hard coating remains maintained under the involvement of non-conserved energies where it engaged the non-conservative forces of ground exerting neutral for electrons of different nature atoms [19]. Many existing discoveries are waiting, in the pipeline, and this is just the beginning, they are in the way to explore the class of grounded thoughts, unbiased views and dynamic approaches across the globe.

The involvement of non-conserved typical energies in converting the gas state carbon atom into other available states carbon atom enables it as a non-ecofriendly element in certain ways because it results into engage the non-conservative forces. We can't do nothing with it as built-in gauge of electron-dynamics of carbon atom is by the nature, but we can understand it and take advantage for a certain time in a certain region as per capability and resources. Again, carbon atom can help to understand the nature of electron-dynamics in atoms of different class of elements along with originating their new physical behaviors, if possible and then developing atomic structures related to unknown elements. And then atoms of which elements involve first force to engage energy and atoms of which elements involve first energy to engage force. Carbon is not an overwhelming material for all the times, but it becomes outstanding when we talk about the basic understanding of electron-dynamics for atoms of different class elements and the life need also. Then comes force and energy where the technological advancements are not yet at level to show them as for the case of visualizing the matter under the application of high-resolution microscopy and to the extent of an atomic resolution. A travelling photon is related to entity of a forcing energy and a photon is related to entity of a forced energy [1]. So, a forced energy entity can't visualize to the forcing energy and matter can't visualize to another matter also. But the photons of certain spatial resolution reflecting at the surface of matter under certain controlled pace enable to image the topography (in the case of morphology) at screen and spotted spots (in the case of structure) in the pattern bring into the observations involved and engaged behaviors of force and energy (or energy and force).

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3.0 Conclusions

In a carbon atom, when 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, it is related to gas state. In the carbon atom, when two electrons of outer ring retain position in the states available at just above the line of east-west poles and two electrons at just below that line, it is related to graphitic state. In the carbon atom, when all the electrons of outer ring retain position in the states available on south-side, it is related to diamond state. Placement of arc-shape energy results into transfer electrons from filled states to unfilled where relevant forces are exerted neutrally converting one state carbon atom to another state originating a new atomic structure under a new physical behavior. Under a neutral behavior of force, a transferring electron of filled state into nearby unfilled state only follow to arc-like trajectory of typical energy. Each state of carbon atom elaborates its own science and so, in the case of atom of each element along with its state if it is existed.

In the case, when structure evolution is two-dimensional for graphitic state atoms, it is under the application of attained dynamics only where opposite pole forces of suitably amalgamated atoms regulate their structure. Forces exerting along opposite sides of each atom if do not restrict atoms to bind under their available difference, they also do not keep atoms from separating, once amalgamated. In the case where binding of graphitic state atoms is under the execution of electron-dynamics, the evolution of structure is one-dimensional binding atoms along one axis under the involved energy of one atom to involved energy of suitable positioned another atom.

Carbon atoms while in nanotube state evolves two-dimensional structure where in one quadrant, energy shape-like arc enables transfer of a certain electron to attain that state which also works as the binding energy where neutral behavior of relevant exerting forces for that transferring electron and the same is the case for opposite quadrant, also. In the evolution of nanotube structure, both space format-surface format and grounded format-surface format (and vice versa) forces are engaged to be exerted neutral at the instant of transferring electrons for nanotube state atom. To nucleate fullerene structure, all four electrons equidistant from the centre involve energy shape-like arc to transfer at dedicated states where neutral behavior of forces exerting in the surface format mainly along with space format for upper-sided quadrants and grounded format for down-sided quadrants in each atom.

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In binding of diamond state atoms, all electrons of outer ring transferred toward the south-side of depositing atom clamp another clamping of energy knot clamped unfilled states of outer ring (toward the ground-side) of deposited atom where those electrons deal the exertion of neutral behavior of forces in grounded format and surface format. So, binding of diamond state atoms is ground to south, but growth is south to ground. In binding of lonsdaleite state atoms also, the same mechanism of binding atoms takes place but only between two electrons of depositing atoms and two unfilled states of deposited atom. In binding of graphene state atoms, all electrons of outer ring transferred toward the north-side of depositing atom clamp another clamping of energy knot clamped unfilled states of outer ring (toward the ground-side) of deposited atom where those electrons deal the exertion of neutral behavior of forces in space format and surface format. So, binding of graphene state atoms is ground to north, but growth is north to ground. Diamond is tetra-double-clamped energy knot ground to south topological structure. Lonsdaleite is bi-double-clamped energy knot ground to south topological structure. Graphene is tetra-double-clamped energy knot ground to north topological structure.

The glassy carbon is related to a fully topological structure. In the structure evolution of glassy carbon, the relevant electrons dealing double clamping of the energy knot is placed from the bottom rear-side in the case of gas state carbon atoms layers and from the top front-side in the case of lonsdaleite state carbon atoms layers. 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 where those electrons deal another clamping of energy knot in each case under the exertion of neutral force of relevant poles from the 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 where those electrons deal another clamping of energy knot in each case under the exertion of neutral force of relevant poles from the rear-side.

Force and energy work inter-changeably; when force is involved then energy is engaged, but when energy is involved then force is engaged. The matter remains as the intermediate component identifying the functioning of force and energy. To originate the different physical behavior of each state carbon atom, non-conserved energies involve engaging non-conservative forces, so, in the case of their structure

evolution. An involved typical energy is non-conserved because it is a sub-part of conserved (discrete) energy of a unit-photon.

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 to understand different phenomena related to optics and photonics, certain force-energy behaviors of atoms of different elements, designing of new materials and light-matter interactions along with many others.

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