Atomic Structure and Binding of Carbon Atoms

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Abstract –Many studies deal synthesis of carbon-based materials because of the versatility of carbon element where lack the arresting of understanding at convincing and compelling levels. A non-conservative energy is required to transfer occupied state electron to nearby unfilled state along both left and right sides of the gas state carbon atom to convert it into its graphitic state where exerting forces of relevant poles of transferring electrons remain neutral at the instant of tracking the arc-like trajectory to go into unfilled state. Changing the position of two electrons in each state carbon atom results into originate its new physical behavior. Different state carbon atoms were obtained under confined inter-state electron-dynamics under the involvement of non-conservative energies where engaging the non-conservative forces instead of conservative were engaged. Structure evolution for graphitic, nanotube, and fullerene states atoms mainly engages the surface format forces where involved arc-shape energies enable execution of confined inter-state electron-dynamics binding to amalgamating atoms in one quadrant, two quadrants and four quadrants to develop structure of one-dimension, two-dimension and four-dimension, respectively. However, a graphite structure is evolved under the application of electron-dynamics of attaining graphitic state atoms as well as under their attained dynamics, only. Evolution of structure in diamond and lonsdaleite state atoms are under the joint application of surface format force and grounded format force where electrons of binding atom deal another clamping of energy knots belonging to unfilled states of deposited atoms while visualizing the force of south to their bottom tips through them. Structural evolution of graphene engages both surface format and space format forces to work neutral at the instant of binding atom through its four electrons dealing another clamping of energy knots belonging to unfilled states of deposited atoms while visualizing the force of north to their top-sides through them. Growth of diamond is south to ground but binding of 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 repetition manner. In glassy carbon, forces of space format, surface format and grounded format work as neutral while binding atoms of successive tri-layers. Due to maintenance of electrons at above ground surface in gas state carbon atoms, they do not attain the favorable point for binding. Hardness of carbon-based materials as per identified in literature is sketched under the exploration of different force-energy behaviors exerting at electron level is described. A carbon atom is a best model to explain binding mechanism in atoms of various elements and 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; 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 depending on the natural confinement of built-in gauge of electrons of atoms, their force and energy is to be considered either in the mode of conservation or in the mode of non-conservation, respectively. Engagement/involvement of characteristic energies and different format force is to be considered as per nature of atoms (its electronic gauge) processing to evolve material of a certain 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 for different gauge under the possible chain of command of energy instead force. However, conservative forces are introduced in neutral state silicon atom for executing confined inter-state electron-dynamics where energy in the form of forcing energy is followed by the configuring trajectory [1]. This is because the electronic gauge of a carbon atom is different as compared to silicon atom

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despite of the fact that the same number of filled states and unfilled states are available in outer ring; the distance of each electron of outer ring from the centre of its atom is different in the case of carbon element and silicon element [2]. 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. Nevertheless, atoms of confined inter-state dynamics of electrons under conservative forces engaged the conservative energy as well placing along their configuring trajectories as discussed elsewhere [3]. It is also essential to know prior to study atomic structure of carbon and binding in the different state atoms where 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 carbon atoms remained the input source. 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 [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, 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].

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Formation of different features tiny sized particles has been discussed elsewhere [11]. The formation 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 development of their large shaped particles where role of the need-in 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]. Formation process of 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 because of exerting surface format force along opposite poles of electrons enabling orientational-based stretching of clamped energy knots in their atoms as discussed elsewhere [16]. Atoms of suitable elements executing electronic 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 interchangeable 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 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

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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 is prohibited and for which a detailed study is given elsewhere [2]. 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, envisaging different format of forces as discussed elsewhere [3].

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.

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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. Twice pair of overt 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 forming at opposite sides because of already inter-crossed twice pair along east-west axes. This results into forming 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 (clamping energy knots) for twelve electrons under their maintained common centre. This centre is related to the reference point of carbon atom in terms of keeping neutral force for electrons when transferring to nearby unfilled states under the given energy for their one window rotation having the shape as per built-in gauge. 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 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 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 (window) down, it is under the engagement of energy shape-like the built-in gauge of transferring electron at both sides of the atom where exertion of relevant forces of electrons remain neutral resulting into exactly follow the trajectory of bound energy to energy knot

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clamped to filled state till the nearby energy knot clamped to unfilled state. This placed 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 at downward side of east-west poles of carbon lattice, three pairs of energy shape-like arc involved to transfer all four electrons of outer ring as three windows-operation executed in transferring electrons to downward unfilled states from both east-west sides of their atom. This results into introduce the diamond state behavior of that gas state carbon atom. Again, the exertion of relevant poles forces to transferred electrons remained neutral, thus, exactly followed the path provided by the linked arc-shape energy to clamped energy knot of filled state to clamped energy knot of 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’ where 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.

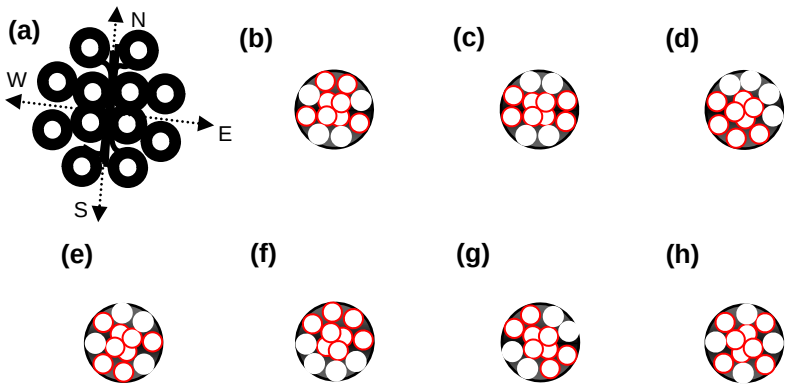

Figure 1: (a) lattice of carbon atom and atomic structure when in (b) gas state, (c) graphitic state, (d) diamond state, (e) lonsdaleite state, (f) graphene state, (g) nanotube state and (h) fullerene state; red color circles denote filled states and grey color circles denote unfilled, drawn in estimation

When gas carbon atom converts into graphitic state, it is under the availability of energy shape-like nearly arc on its both sides as transferred electrons maintained negligible neutral force of grounded format and more neutral force of surface format. However, transferring necessitating electrons of graphitic state atom to lonsdaleite

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state atom, an energy shape-like arc along west to south and an energy shape-like arc along east to south is placed where transferring electrons from filled states to nearby unfilled states maintained negligible neutral force of surface format but more neutral force of grounded format. In conversion of lonsdaleite state atom from graphitic state atom, only two electrons followed those left-side and right-side placed characteristic energies. But, on conversion of diamond state atom from lonsdaleite state atom, further two electrons followed the placed characteristic energies at both left-side and right-side of the atom. 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 where ground point of the carbon atom is fully grounded is called diamond state atom, thus, transferred electrons under their maximum potential energy exerted force to clamped energy knots to deal expansion under the maximum limit.

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 utilized to bind it to the clamped energy knot of electron of atom amalgamated adjacently (atom A). However, that energy was given in advance to work for the trajectory of transferring electron where related forces (mainly surface format force and a bit grounded format force) of that electron at that instant remain neutral, thus, that atom bound while converting into graphitic state. On binding of atom B to atom A under binding energy shape-like less in arc and more in line, they gained neutral state for east-west poles. 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 behavior of surface format force and only a small fraction of energy is maintained under the neutral behavior of grounded format force when the electron transferred from top (gas state) to adjacent pole. Here for each gas atom one of the electron, at side (west-side) where atom is not amalgamating, is required to transfer earlier. So, only to one side, energy is involved to attain graphitic state atom, which binds to amalgamating (amalgamated) atom, adjacently. This results into evolution of graphite structure having only one-dimension where confined inter-state electron-dynamics engaged non-conservative forces by exerting their neutral behavior restricting the execution to only one quadrant of the atom. On

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binding of graphitic state atoms in one-dimensional structure, they deal stretching of energy knots clamped electrons because of the exerting surface format forces straight-forwardly along their east-west poles. This results into uniform elongation of atoms from the centers. Elongation of graphitic atoms from centers along opposite poles where converting one-dimensional arrays of tiny grain to structure of smooth elements as discussed elsewhere [5].

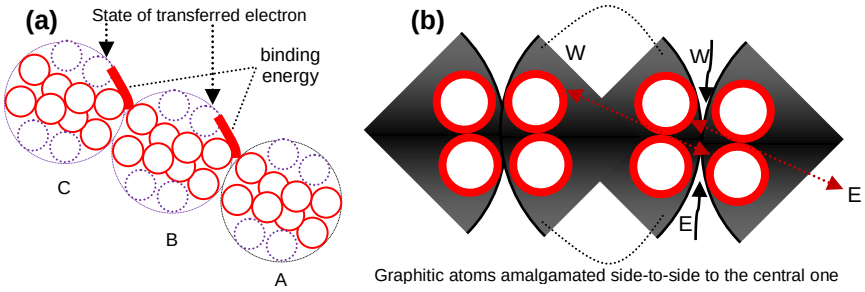

Figure 2: Structure evolution of graphitic state atoms under the application of (a) electron-dynamics – a one-dimensional structure and (b) attained dynamics – a two-dimensional structure

When both atoms amalgamated under attained graphitic state, they bound under only their attained dynamics, thus, evolved structure without having the possibility of 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 the atoms. Because of the slight difference of exerting east-west forces at point of keep amalgamating 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 graphitic state atoms takes place at average-leveled ground surface because of remaining amalgamating adjacently. This is the reason why graphite structure deals porosity, black shine and very low hardness. 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. Because the orientation of electrons in graphitic state atoms is more along the east-west poles by remaining under the orientational-based stretching of their clamped energy knots.

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 its conversion is made into diamond state. A diamond state carbon atom, which has

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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 enjoying the maximum potential energy for their fixed oriented exerting force, therefore, no more expansion of clamped 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 resulting into maintain diamond state of their atom. Thus, that diamond atom is in full limit of solid behavior under conserved energy, force and matter, fairly speaking may be addressed. 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.

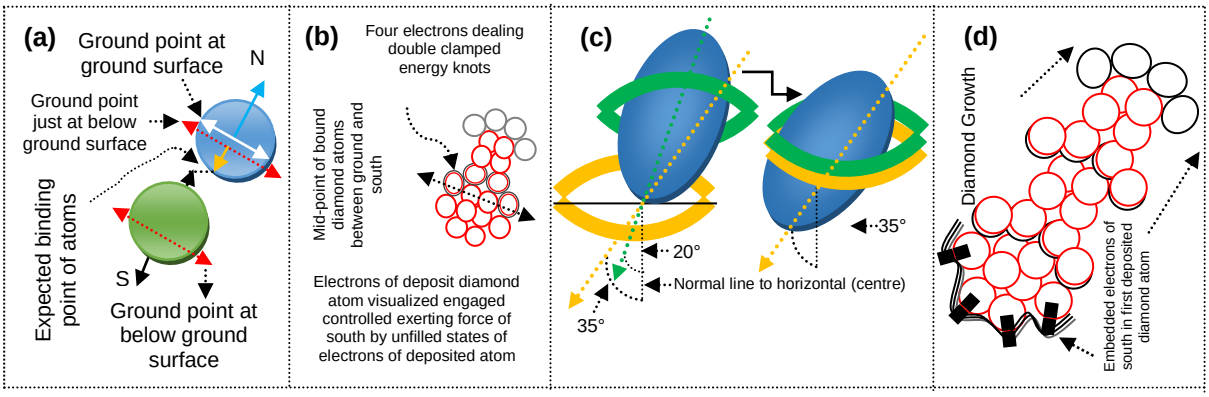

Figure 3: (a) ground points of lonsdaleite and diamond state atoms along with expected binding point, (b) diamond atom when just to bind (deposit) deals double clamping of energy knots of its four electrons of south visualizing the engaged controlled exerting force for bottom-sides through rightly located below four unfilled states of deposited diamond atom, (c) orientation of single electron of lonsdaleite state atom prior to deal conversion and orientation when it dealt conversion into diamond where clamped by another energy knot related to unfilled state of single electron of diamond state and (d) growth of diamond is south to ground; 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 those electrons dealt double clamping of energy knots (drawn in estimation)

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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 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 also, 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 undertaken where by taking the advantage of controlled exerting orientational force of electrons under the nature of their fixed north-south 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 controlled engaged exerting force to bottom-side through rightly located each unfilled state of outer ring of deposited (embedded) diamond state atom. On dealing by each electron (four filled states in outer ring of depositing diamond state atom) another clamping of energy knot (four unfilled states in outer ring of deposited diamond state atom) resulting into binding between those diamond state atoms 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 as per exertion of their fixed poles forces, thus, they together build a new binding point for the following depositing diamond state atom.

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°).

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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 at each time of 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-conservative 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 along south-pole 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 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 where both atoms adjust this mechanism on naturally basis as both the orientation of electrons and expansion-contraction level of clamped energy knots to filled and unfilled states in both atoms rightly favour under absolute control of force of nature where binding of atoms is taking place ground to south but growth behavior of diamond is south to ground (in Figure 3d).

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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 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 state atoms includes surface format force and space format force to be neutral while 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 carbon atom of nanotube state evolves structure under the involved 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 carbon state 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 quadrants engaging the identical shape characteristic energy (arc-like shape). In the carbon atom, transfer of electron to nearby unfilled state of the same quadrant in its both upper east and lower west (or lower east and upper west) sides is required to attain nanotube state. The energy shape-like arc is involved to regulate transfer of electron to dedicated state and in the both opposite quadrants of the targeted atom resulting into bind amalgamating atoms under the attained dynamics at both sides of the central atom as shown in Figure 4 (a). Therefore, the

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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 having two opposite quadrants of nearly plane surface form angle in the mid of quadrant nearly, in either way, the evolution of structure is related to two-dimensional, but the overall shape of nanotube is appeared more likely in a one-dimensional structure as shown with two options in Figure 4 (a).

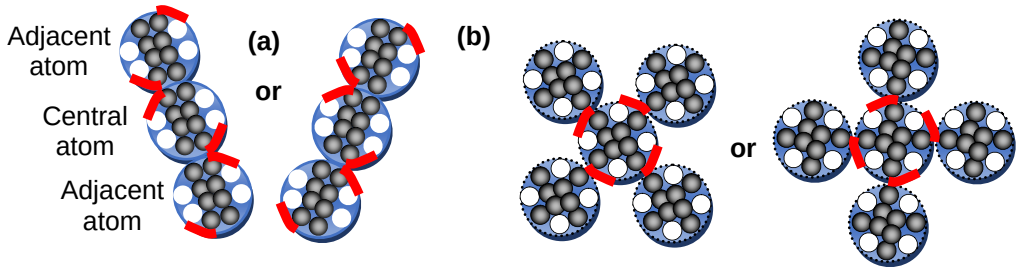

Figure 4: (a) nanotube structure– a two-dimensional structure where the involved energy shape-like arc in opposite quadrants of targeted atom bound atoms in successive manner and (b) fullerene (buckyballs) –a four-dimensional structure where the energy shape-like arc is involved in each quadrant of targeted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

When a carbon atom attains fullerene state under the transfer of electron at each pole while engaging the energy shape-like arc equally in all four quadrants of plane surface where mainly the force of surface format is engaged to exert neutral behavior at instant of each transferring electron along with the minute contribution of exerting neutral force of space format for two quadrants and grounded format for two quadrants. A characteristic energy shape-like arc while binding of identical state atoms at point of its each electron executed dynamics is shown in Figure 4 (b); evolution of fullerene structure is shown in two options. The binding of four fullerene state carbon atoms with the central fullerene state carbon atom considers 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 engaged to be exerted neutral including minute level of forces of space format and grounded format. Nucleation of fullerene state atomic binding in the basis-structure evolution is the best example to represent

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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 considers 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.

Glassy carbon engages all three formats of forces where work neutral in exertion while binding layers of three different state carbon atoms to evolve structure. Atoms of centre layer are in graphitic state. 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). Layers of gas and graphitic state atoms bind under the under 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 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 the 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 each sequence of tri-layer as shown in Figure 5 (b).

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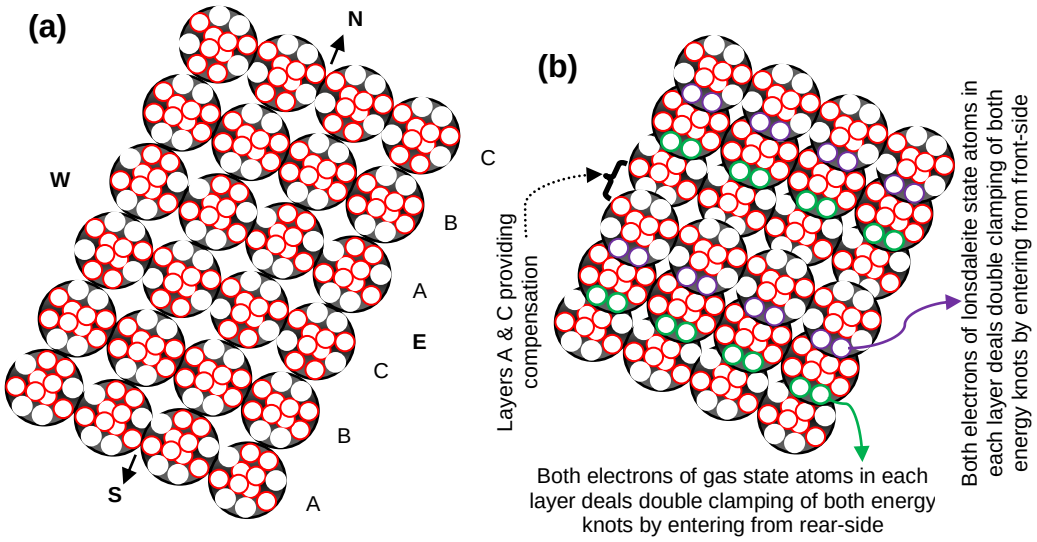

Figure 5: Structure evolution of glassy carbon when three consecutive layers of atoms (a) gas state -layer A, graphitic state -layer B and lonsdaleite state -layer C and (b) binding of repeated tri-layers to evolve topological structure of glassy carbon

In evolving topological structure of glassy carbon, compensation is granted at each repetition of tri-layer because of the overlap 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 engage forces of all three format and in reverse order where atoms of gas state layer are exerting grounded format force instead of space format force to be neutral while atoms of lonsdaleite state layer are exerting 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 the binding of upper and lower layers.

The discussed characteristic energies in developing structures of different state carbon atoms are significant but they are not establishing by itself to be like the shape of trajectory (gauge) because, electron-dynamics in all states of carbon atoms remain under the obligation of non-conservative forces as they are engaged by the involvement of non-conservative energies where exerting their neutral behavior (at instant of transferring an electron from filled state to nearby unfilled state). Therefore, involved energies don't let go transferring electrons other than their dedicated states in the atom as their exerting forces are under the engagement of neutral behavior.

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That's way, it has been disclosed that none of atoms ionize [4]. 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 already linked (connected) to establish the viable path. 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 exerting force for it to be neutral resulting into a bit altered expansion-contraction of clamping energy knot, which resulted into noncompliance of placed characteristic energy. Therefore, because of non-conservative energy-force behaviors, that electron preferred to stay back within the occupied state under the first attempt of following the trajectory of characteristic energy or even the second attempt of following the trajectory of characteristic energy. So, the probability is still existed for electron to be not transferred into the unfilled state, hence, its atom doesn't go for another state of carbon, hence, binding of its certain state.

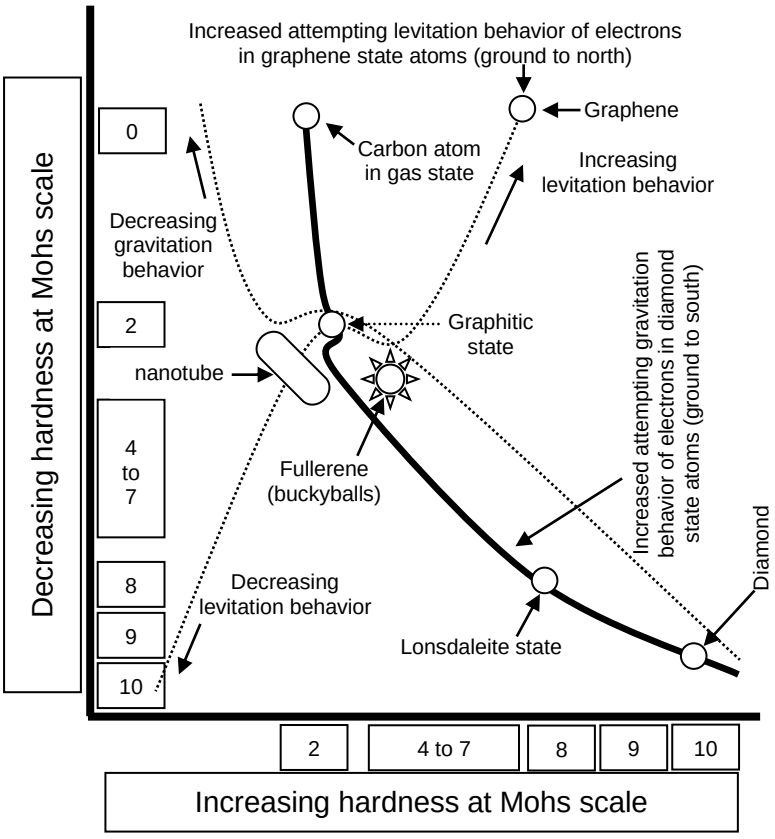

Figure 6: A sketch of approx. hardness (at Mohs scale) available in the literature for the structure of different carbon states (allotropic forms) versus dealt levitation-gravitation behaviors

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

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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 [5].

Electrons of outer ring transfer to nearby unfilled states to originate different states of their carbon atom. 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 exert 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. The energy and force of an isolated atom (or in its original state) is to be remained conserved. At the instant of binding carbon atoms in its any form of structure, engaged force to exert 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 established shaped energy (discrete amount), engaged forces not only exert neutral but they are also conserved (discrete) for each electron under certain orientation having dedicated state.

Wherever, the non-conservative forces (forces of exerting neutral behavior) engaged to address the dynamics of electrons in their suitable atoms, they are under the involvement of non-conservative energies, firstly. Therefore, the non-conservative (characteristic) energies involve the regulation of dynamics of electrons in the carbon atom where the non-conservative forces engage in exerting their neutral behavior. However, wherever, the conservative forces involved to address the dynamics of electrons in their suitable atoms, they engaged (or configured or placed) the conservative energies. As, in the case of silicon atom while transferring filled state electron to unfilled one, conservative forces are involved (instead engaged) to regulate the dynamics of electron in engaging or configuring or placing (instead involving) the conservative energy as discussed elsewhere [1]. Because of

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the one additional filled ring of electrons around zeroth ring where neutral state electrons 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). This indicates that distance of outer ring from the centre of an atom in different elements is the core in deciding what sort of the behavior is considered to bind atoms of certain class of elements. Structure of hard coating remains maintained under the involvement of non-conservative energies where engaging the non-conservative forces of ground surface under exerting their neutral behavior were engaged as well [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.

3.0 Conclusions

In a 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, it is related to gas state. 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 at just below that line, it is related to graphitic state. In the carbon atom where all the electrons of outer ring retain position in states available at 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 exert neutral behavior converting a carbon atom from one state to another originating a new structure of a new physical behavior.

In the case where structure evolution is two-dimensional for graphitic state atoms, it is under the application of attained dynamics only. Forces of surface format exerting along opposite sides of each atom if do not remain atoms bind under their available difference, they also do not keep atoms 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.

Carbon atoms while in nanotube state evolves two-dimensional structure where in one quadrant energy shape-like arc enables transfer of certain electron to attain that state also works as the binding energy where neutral behavior of exerting relevant forces for that electron and the same is the case for opposite quadrant, also.

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In the evolution of nanotube structure, mainly the surface format force is engaged along with minute level forces of grounded format and space format to exert 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 exerting their relevant forces remain neutral. In the evolution of fullerene structure, mainly the surface format force is engaged along with the minute level of forces of grounded format (in two quadrants) and space format (in two quadrants) to exert neutrally at the instant of transferring electron in the relevant quadrant.

In binding of diamond state atoms all electrons in outer ring transferred toward the south-side of depositing atom clamp another clamping of energy knot clamped unfilled states in outer ring (toward the north-side) of deposited atom where those electrons visualized the perfectly orientated (neutral) force of south (grounded format) to bottom-sides and the perfectly orientated (neutral) force of east-west (surface format) in the centers. 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 in outer ring transferred toward the north-side of depositing atom clamp another clamping of energy knot clamped unfilled states in outer ring (toward the south-side) of deposited atom where those electrons visualized the perfectly orientated (neutral) force of north (space format) to top-sides and the perfect orientated (neutral) force of east-west (surface format) in the centers. 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 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; hence, those electrons are candidate to deal

double clamping of energy knots by visualizing inside the energy knots of unfilled states 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; hence, those electrons are candidate to deal double clamping of energy knots by visualizing inside the energy knots of unfilled states from the 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 force-energy behaviors of atoms of different elements, designing of new materials and light-matter interactions along with many others.

References:

[1] M. Ali, Revealing the Phenomena of Heat and Photon Energy on Dealing Matter at Atomic level. https://www.preprints.org/manuscript/201701.0028/v10.

[2] M. Ali, Why atoms of some elements are in gas state and some in solid state, but carbon works on either side (2018). https://www.preprints.org/manuscript/201803.0092/v2.

[3] M. Ali, Structure evolution in atoms of solid state dealing electron transitions. http://arxiv.org/abs/1611.01255.

[4] M. Ali, Atoms of electronic transition deform or elongate but do not ionize while inert gas atoms split. http://arxiv.org/abs/1611.05392.

[5] M. Ali, I –N. Lin. Phase transitions and critical phenomena of tiny grains carbon films synthesized in microwave-based vapor deposition system. http://arxiv.org/abs/1604.07152.

[6] M. Ali, M. Ürgen, Switching dynamics of morphology-structure in chemically deposited carbon films -A new insight, Carbon 122 (2017) 653-663.

[7] M. Ali, M. Ürgen, Deposition Chamber Pressure on the Morphology of Carbon Films (2018). https://arxiv.org/abs/1802.00730.

[8] M. Ali, M. Ürgen, Simultaneous growth of diamond and nanostructured graphite thin films by hot filament chemical vapor deposition, Solid State Sci. 14 (2012) 150-154.

[9] S. Link, M. A. El-Sayed, Shape and size dependence of radiative, nonradiative and photothermal properties of gold nanocrystals, Int. Rev. Phys. Chem. 19 (2000) 409- 453.

[10] S. C. Glotzer, M. J. Solomon, Anisotropy of building blocks and their assembly into complex structures, Nature Mater. 6 (2007) 557-562.

[11] M. Ali, I –N. Lin, The effect of the Electronic Structure, Phase Transition, and Localized Dynamics of Atoms in the formation of Tiny Particles of Gold, http://arXiv.org/abs/1604.07144.

[12] M. Ali, I –N. Lin, Development of gold particles at varying precursor concentration, http://arxiv.org/abs/1604.07508.

[13] M. Ali, I –N. Lin, Tapping opportunity of tiny shaped particles and role of precursor in developing shaped particles, http://arxiv.org/abs/1605.02296.

[14] M. Ali, I –N. Lin, Controlling morphology-structure of particles at different pulse rate, polarity and effect of photons on structure, http://arxiv.org/abs/1605.04408.

[15] M. Ali, I –N. Lin, Formation of tiny particles and their extended shapes – Origin of physics and chemistry of materials, http://arxiv.org/abs/1605.09123.

[16] M. Ali, The study of tiny shaped particle dealing localized gravity at solution surface. http://arxiv.org/abs/1609.08047

[17] M. Ali, Nanoparticles-Photons: Effective or Defective Nanomedicine, J. Nanomed. Res. 5 (2017): 00139.

[18] M. Ali, I –N. Lin, C. –J. Yeh, Predictor packing in developing unprecedented shaped colloidal particles. https://www.preprints.org/manuscript/201801.0039/v2.

[19] M. Ali, E. Hamzah, M. R. M. Toff. Hard Coating is Because of Oppositely Worked Force-Energy Behaviors of Atoms. https://www.preprints.org/manuscript/201802.0040/v2.

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