Transition Energy, Orientation Force and Work Done in Transitional Behavior Atoms: Formulating New Principles in Thermodynamics

Mubarak Ali
Department of Physics, COMSATS University Islamabad, Islamabad –45550, PAKISTAN
E-mail: mubarak74@mail.com, mubarak74@comsats.edu.pk

Abstract: A study of different parameters in thermodynamics is important for sustainable science behind various physical and chemical phenomena. This study finds an anomaly associated with the first law of thermodynamics. The anomaly is resolved for the equations of change in the internal energy of a system composed of atoms. A gas atom involves transitional energy gained to undertake transition state. Hence, the work is carried out by that gas atom. This can be registered symbolically in a plus form. A solid atom involves transitional energy absorbed in undertaking transition state. Hence, the work is carried out on that solid atom, which can be registered in a minus form. At typical level of a ground surface, atoms give birth to condensed matter physics, so atoms of solid behaviors also give birth to transition matter physics. In a system composed of gas or solid atoms, varying energy and force introduce different transition states. Orientational force of an electron either in the transition of gas atom or in the transition of solid atom is by varying potential energy under transitional energy. Thus, understandable concepts of cooling and heating are deduced from their respective gas atoms and solid atoms when recovering from their achieved ‘attaining liquid states’.
Keywords: Electrons; Atoms; Transition energy; Orientation force; Internal energy; Thermodynamics; Cooling and Heating

1. Introduction

A careful observation of atomic behavior with respect to influencing force at electron level shows irregularity in the basic principles of thermodynamics. An anomaly is explicitly found in the first law of thermodynamics. The law is an essential element of thermodynamics, which governs science behind many remarkable applications. Originally, the work was taken negatively when performed by gas atoms under compression, and the work was taken positively when performed on gas atoms under expansion. However, the work is discussed entirely oppositely in this study. In this context, the work performed by solid atoms and the work performed on solid atoms can also be differentiated. A nature of exerting force at electron level in the gas atoms does not express relation with the change in pressure, temperature and volume. A force per unit area is a pressure which is only particularized. This study deals with exerting force at electron level in levitational manner for a system composed of gas atoms and in gravitational manner for a system composed of solid atoms. So, the change in internal energy of a system comprising atoms of either gas behavior or solid behavior is in the manner to interpret the law in a different way.

Atoms of gas and solid states undertaking liquid states possess a different force and energy relationship [1]. The phenomena of heat and photon energy dealing with matter at electron level were discussed [2]. The flowing atoms of inert behavior split under the propagation of excessive photonic field [3]. In the case where electrons of atoms do not entertain the modes of conservative forces, atoms form a structure rather than evolve a structure [4]. Atoms of all those elements, where suitable electrons execute dynamics under the conservative mode of forces, evolve structures rather than form structures [5]. Considering the formation of tiny particles and their coalescences for larger particles, the origin of physics and chemistry was discussed [6]. Controlling morphology and the structure of gold tiny particles is due to the controlled behavior of gold atoms under different pulse rates [7]. The role of atomic behavior is critical in nanomedicine application while using in the form of a nanoparticle [8]. Due to the nature of a carbon atom adopting many allotropic forms, tiny grains exhibit different behaviors in the analyses of carbon films [9]. Assembling blocks for larger particles provide a possibility to treat atoms and molecules as materials of tomorrow [10]. Understanding the dynamics of tiny particles' formation is essential prior to going for their assembling into a larger particle [11]. At nearly identical process parameters, gold and silver solutions were processed, where tiny particles along with the larger sized particles developed in different shapes [12]. While attaining vapor and condense behaviors of solid and gas atoms respectively, they deposited in the form of hard coating in a physical vapor deposition unit [13].

The focus of study is to disclose mathematically a distinct nature of force engaged under involved transitional energy for suitable atoms of gas and solid when obeying their transitional states. A distinct nature of force exerting at electron level formulates different equations of work in a gas atom. A solid atom also formulates different equations of work when it is carried out on the atom, and when it is carried out by the atom. The involved transitional energy introduces their ‘attaining liquid states’ at respective ground points near or at typical leveled ground surface. On substituting the values of executed work of the gas atom and solid atom, different equations of change in the internal energy, i.e., ‘dU’ are formulated for them. Different equations of change in the internal energy are formulated for a gas atom when it achieves an ‘attaining liquid state’ and that ‘attaining liquid state’ reinstates to its original state under the self-driven mechanism. Here, a process of cooling is observed. Different equations of change in the internal energy, i.e., ‘dU’ are formulated for a solid atom when solid to ‘attaining liquid state’ occurs and ‘attaining liquid state’ to solid state occurs. Here, a process of heating is observed.

2. Results and Discussion

According to the existing principles of thermodynamics, the internal energy of a gas system mainly varies due to temperature. If the internal energy of gas atoms varies under the variation of temperature, there is not a different case for solid atoms. However, because of the different nature of solid atoms to gas atoms and the issue of self-driven capability, they signify a different scope of materials science, physics and chemistry. In the atoms of suitable behavior, i.e., either in gas or in solid, their liquid behaviors at typical level ground surface are accessible. The resultant liquids may indicate different colors, taste and flow. Either in the gas state atom or in the solid state atom, the access to liquid behavior of state is under suitable force and energy relationship [1]. Hence, the force and energy relation of an atom is directly connected to modes of electrons, where their potential energy along with orientational force under involved transitional energy (E_T) changes the trend of energy knot clamping. This way, atoms (of gas and solid) deal with different force and energy to accept certain trends of their lattices or energy knot nets. In addition to the east-west forces, electrons of atoms at work deal with correspondence to levitational force and gravitational force depending on the schemes of their formation [1].

In processing different solid materials by suitable techniques and methods, it is hard to say that atoms retain their original states. This points out that solid atoms deal with elongation or deformation behavior under condensed matter physics. No doubt, atoms undertake different possible transition states. When it is said that an atom is working, it becomes meaningful that it is in a state of transition. The scheme of force and energy varies for it in the course of breaking ideal isolation (original behavior). Hence, the first law of thermodynamics is to be addressed in this perspective. Again, it is said that atoms introduce condensed matter physics, and this indicates that atoms of solid behavior deform or elongate. However, to undertake deformation and elongation behaviors, in fact, solid atoms introduce transitioned matter physics. So, atoms of suitable gas behaviors also introduce transitioned matter physics but not in elongating or deforming manner.

In transition state atoms of both gas and solid behaviors, the energy is involved in the transitional manner. This way, engaging levitational forces and engaging gravitational forces are the ones orientating electrons both adjacently and laterally in gas atoms and solid atoms respectively. The transition states of atoms are successively in the recovery, neutral, re-crystallization and liquid states. In each transition state of an atom having gas behavior or solid behavior, a different 'E_T' is involved to maintain potential energy of electrons. Accordingly, electrons deal with the prepared conditions of clamping energy knots. Due to the involved 'E_T', a force is engaged to keep establishing the orientations of electrons in an atom. However, in a natural behavior of an atom, a controlled orientating force for each electron remained involved. In this manner, atom also keeps the conserved energy of each electron instead of 'E_T'. Nevertheless, an atom, either in gas behavior or in solid behavior, does not break the ideal isolation. This way, atoms possess respective ground points at their original levels. Here, atoms execute confined inter-state electron dynamics. In atoms of gas and solid states, original levels of ground points are in the space format and grounded format respectively, dealing with the established exertion of force at electron level [5].

The electrons of transitional behavior atoms undertake infinitesimal displacements where energy knots remain also clamped [1]. So, such transitions of electrons do not infer migration from filled states to nearby unfilled states in their respective atoms. In other words, atoms do not execute confined inter-state electron dynamics. In fact, transitions infer infinitesimal displacements of electrons within their clamped energy knots. These are under the variation of (potential) energy of an atom, so the required energy to introduce the transition(s) of an atom is called 'E_T' of that atom, where clamped energy knots to electrons adjust transition(s) accordingly.

Atoms of different gas behaviors are categorized in gaseous elements on the basis of their characteristics. The same is the case in atoms of solid behaviors. Under the original state behavior, an atom of any element deals with energy and force of conserved behavior. According to transitional behavior of an atom, electrons tilt for different orientations by keeping clamping in their energy knots. Electrons experience different levels of exerting levitational force when they are in gas atom, and different levels of exerting gravitational force when they are in solid atom. Hence, that atom maintains a different level of its 'E_T', too. This is the case of each established transition state in an atom, i.e., either gas or solid. However, a force and energy behavior in each established transition state of an atom – either gas or solid varies at small scale. Nonetheless, they exhibit features of different color and odor, etc. at diversified scale or large scale when such atoms form a cluster at micro or nano scale. Electrons mainly experience the levitational force in atoms of gas behaviors from their north (upward) side because of having more fraction of their matter or length to that side. Electrons mainly experience the gravitational force in atoms of solid behaviors from their south (downward) side because of having more fraction of their matter or length to that side. Small sections of electrons remain uncovered from clamped energy knots in both atoms of gas and solid states to experience the influence of forces due to east-west poles (right-left sides). Further details on atoms in gaseous and solid states are given elsewhere [1].

To decrease the levitational force (at electron level) of a gas atom, ‘E_T’ is being gained by it. The gained ‘E_T’ of a gas atom maintains potential energy of left-positioned electrons and right-positioned electrons (at the centre of their atom). This is through orientating the orientation respectively clockwise and anti-clockwise in the course of transition state. Infinitesimal displacements of electrons are undertaken through engaged levitational force for each established transition state in clamped energy knots. Involving ‘E_T’ of a gas atom to undertake transition state is inversely proportional to orientating levitational force engaged at electron level [1]. Here, the job is carried out by the gas atom to convert it into an ‘attaining liquid state’. Thus, it works positively to change the state as in equation (1).

$$\Delta W = +F_L\,(dx^{\perp}) \ldots (1)$$

However, an achieved ‘attaining liquid state’ (of gas) atom goes through the process, which is not by the atom itself to reinstate its original state, i.e., the gas state. Hence, the work is carried out on the atom of achieved ‘attaining liquid state’ to reinstate it into original state as given in equation (2).

$$\Delta W = -F_L\,(dx_{\top}) \ldots (2)$$

ΔW designates ‘change in work’. Here, ($dx^{\perp}$) and ($dx_{\top}$) indicate the infinitesimal displacements of electrons from top to bottom and bottom to top respectively in their clamped energy knots. In equations (1) and (2), ‘F_L’ indicates the engaged orientating levitational force at electron level.

A solid atom absorbs ‘E_T’ to decrease the gravitational force at electron level. The absorbed ‘E_T’ of a solid atom maintains potential energy of electrons in transition state through displacement at infinitesimal level. In clamped energy knots, electrons undertake displacement through the engaged gravitational force for transition state. Involving ‘E_T’ of a solid atom to undertake different transition states is directly proportional to orientating gravitational force engaged at the electron level [1]. Here, the solid atom works and gets converted into an ‘attaining liquid state’, but the resultant 'attaining liquid state' atom works by itself to restore the original state, i.e., the solid state. Hence, work on the solid atom functions to change the state into an achieved 'attaining liquid state' as shown in equation (3) by a negative sign and the atom of achieved 'attaining liquid state' reinstates original state by itself as indicated by a positive sign in equation (4).

$\Delta W = -F_G\,(dx_{\top})$ … (3), $\Delta W = +F_G\,(dx^{\perp})$ … (4)

Here, $(dx_{\top})$ and $(dx^{\perp})$ indicate the infinitesimal displacements of electrons from bottom to top and top to bottom respectively in their clamped energy knots. In equations (3) and (4), 'F_G' indicates the orientating gravitational force engaged at the electron level.

Figure 1 (a) shows the gas atom at work when it is in original gas state and in achieved 'attaining liquid state'. Figure 1 (b) shows the functions of a solid atom when it is in original solid state and when it is in achieved 'attaining liquid state'. The zone of gas atom in original gas state is above the typical level of ground surface. The zone of solid atom in original solid state is below the typical level of ground surface. Many gas and solid atoms can keep ground points at (or near) the typical level ground surface when they achieved 'attaining liquid states' as displayed in Figure 1 (a) and Figure 1 (b) respectively.

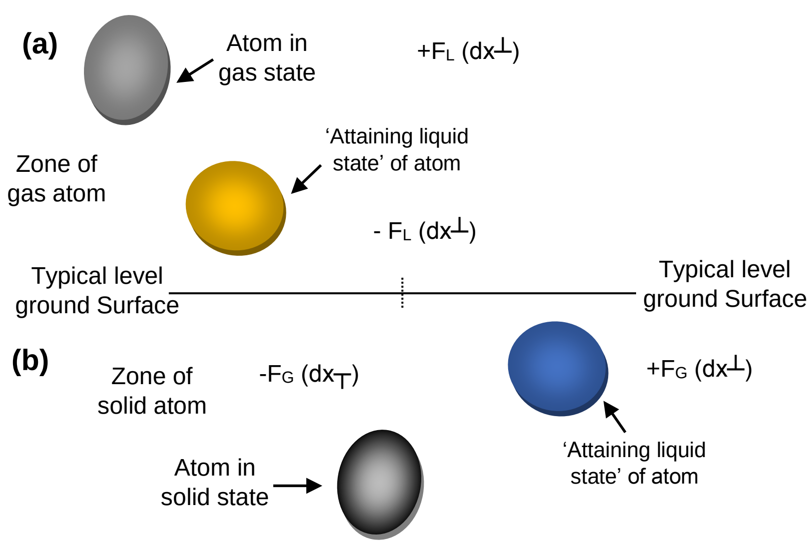

Figure 1: (a) gas atom and (b) solid atom at work in original and achieved 'attaining liquid states'

When a gas atom undertakes an established transition state, it gains energy, i.e., electrons move to the downward sides from their original positions. Here, engaged levitational force positioned electrons to greater degree on left sides of normal lines drawn to their centers. The atom was already in original gas state under the maximum possible degree of orientations of left-positioned electrons to left sides and right-positioned electrons to right sides of normal lines drawn to their centers. When the achieved 'attaining liquid state' of the gas atom is reinstated, i.e., going into original gas state, it is under the recovering positions of electrons clamped within energy knots. Here, the atom goes through a certain mode of 'E_T' to position electrons for dedicated orientations while remaining clamped within energy knots. A detailed study regarding orientations of electrons in gas atoms in their different established transition states is discussed in a separate study [1].

A solid atom maintains the maximum gravitational behavior of electrons when they are in the original solid state. Thus, to achieve an 'attaining liquid state', the work is done on it to position electrons through tilting. To tilt the electrons of solid atom for achieving their 'attaining liquid state', 'E_T' involves (in the sense of absorbing) to achieve their required orientations. However, to restore that achieved 'attaining liquid state' into original solid state, 'E_T' involves (in the sense of gaining) to achieve initial orientations of electrons. A detailed study regarding orientations of electrons in solid atoms in their different established transition states is discussed elsewhere [1].

At the required level of 'E_T' in certain transition state gas atom, electrons move down (by tilting along the east-west poles) for infinitesimal displacements and by remaining clamped within energy knots. In this case, a single electron of hypothesized natured gas atom is shown in Figure 2 (a). Here, the levitational force is engaged in orientational manner. In the case of solid atom, electrons move up (by tilting along the east-west poles) for infinitesimal displacements by remaining clamped within energy knots. In this case, a single electron of hypothesized natured solid atom is shown in Figure 2 (b). Here, the gravitational force is engaged in orientational manner.

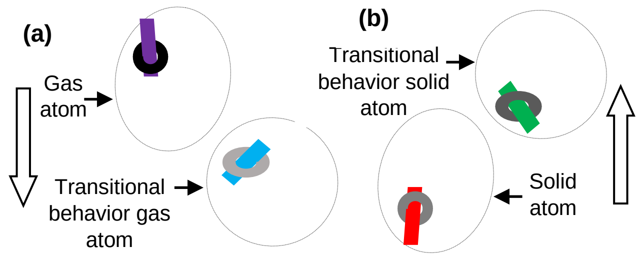

Figure 2: A single electron of hypothesized natured atom shows (a) original gas behavior and transitional gas behavior and (b) original solid behavior and transitional solid behavior

According to the existing principles of thermodynamics, a change occurs in the internal energy (dU) of a gas atom when it is converted into 'attaining liquid state', which is stated as $dU = \Delta Q - \Delta W$. On substituting the value of the investigated work as is shown in equation (1), it becomes $dU = \Delta Q - F_L\ (dx^{\perp})$ … (5). Here, 'ΔQ' is related to change in 'E_T', which is in a gained manner.

However, a change in the internal energy (dU) of an achieved 'attaining liquid state' atom restoring original gas state is stated as $dU = \Delta Q - (-\Delta W)$. On substituting the value of the investigated work as shown in equation (2), it becomes $dU = \Delta Q + F_L\ (dx_{\top})$ … (6). Here, 'ΔQ' is related to 'E_T', which is changed in an absorbed manner.

This way, a change in the internal energy (dU) of a solid behavior atom occurs when it is converted into an 'attaining liquid state', and it is stated as $dU = \Delta Q - (-\Delta W)$. On substituting the value of the investigated work as shown in equation (3), it becomes $dU = \Delta Q + F_G\ (dx_{\top})$ … (7). Here, ΔQ is related to 'E_T', which is changed in an absorbed manner.

Nevertheless, the change in the internal energy (dU) of an achieved 'attaining liquid state' atom restores original solid state, and it is stated as $dU = \Delta Q - \Delta W$. On substituting the value of the investigated work as shown in equation (4), it becomes $dU = \Delta Q - F_G\ (dx^{\perp})$ … (8). Here, ΔQ is related to 'E_T', which is changed in a gained manner.

In an ideal system, gas and solid atoms maintain their respective gained and absorbed 'E_T' by changing the ground points at required levels. When a gas atom gains 'E_T' to achieve an 'attaining liquid state', 'F_L' of electrons decreases while potential energy of electrons increases. When a solid atom absorbs 'E_T' to achieve an 'attaining liquid state', 'F_G' and potential energy of electrons decreases. Further details are given elsewhere [1].

When left-positioned electron to the centre of its hypothesized natured gas atom is considered to achieve an 'attaining liquid state', the formation of typical energy having trajectory shaped-like downward ends arc (⌒) is in clockwise orientation shown in Figure 3 (a). The orientation of the tilting electron is in clockwise rotation under the exerting force along with ~40° to ~5° left; the orientation of the tilting electron is in clockwise rotation under the neutral force along with ~5° to 0° left, and is under the exerting force along with 0° to ~40° right. These orientations are from normal lines drawn to the centre, which configure the trajectory shaped-like downward ends arc. Here, the generated typical energy deals with cooling on separation. When that achieved 'attaining liquid state' of electron reinstates its original gas state under anti-clockwise tilting, typical energy of cooling is removed from its point of generation. In gas atom, a removal of typical energy generated along the tilting electron is under the eccentric behavior, where it inverts the shape as shown in Figure 3 (b). A solid line shown in the typical energy configured along the trajectory of electron is because of the neutral force's portion in that region (~5° to 0°). Thus in that region, energy is only fused. This infers that the orientation of electron (source) is vital for the preserved working of energy and force. Hence, a process of cooling is observed in suitable atoms of gas when they convert from their achieved 'attaining liquid states'.

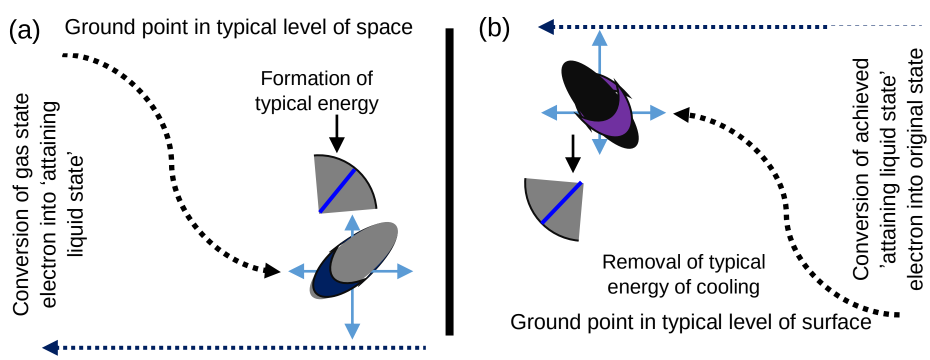

Figure 3: (a) a typical energy in arc shape is configured along the clockwise tilting of left-positioned electron to the centre of its hypothesized natured atom when it is converting from a gas state to achieve an 'attaining liquid state' where orientation under exerting force is ~40° to ~5° left, and under neutral force is ~5° to 0° left, and under exerting force is 0° to ~40° right from normal line drawn to its centre, and (b)

removal of typical energy of cooling on restoring achieved 'attaining liquid state' to gas state under self-driven orientation and potential energy of electron (~40° to 0° right, 0° to ~5° left and ~5° to ~40° left)

When a left-positioned electron to the centre of its hypothesized natured solid atom is considered to achieve an 'attaining liquid state', the formation of typical energy having trajectory shaped-like upward ends arc (‿) is in anti-clockwise orientation shown in Figure 4 (a). In suitable solid atom, the orientation of the left-positioned electron is in anti-clockwise rotation where its tilting is under the orientational force exerting along with ~40° to ~5° left; in suitable solid atom, the orientation of the electron is in anti-clockwise rotation, where its tilting is under the neutral orientation force along with ~5° to 0° left, and is under the orientational force exerting along with 0° to ~40° right. Orientations are from normal line drawn to its centre, so that electron configures the trajectory of typical energy under uninterrupted transitions. A configured typical energy is in the shape like upward ends arc. This typical energy is in the same shape as in the case of gas atom, but from the south side of the electron due to orientation on that side. However, its removal at the point of generation is not because of the eccentricity when the electron restores its state to solid state from achieved 'attaining liquid state'. On tilting typical energy shaped-like upward ends arc to opposite side at the point of generation, it again divides into tits and bits of heating shown in Figure 4 (b). The same is the case when right-positioned electron to the centre of its solid atom is considered. Despite its tilting takes place clockwise, it is still from the south side. Thus, a process of heating is observed in suitable atoms of solid when they convert from their achieved 'attaining liquid states'.

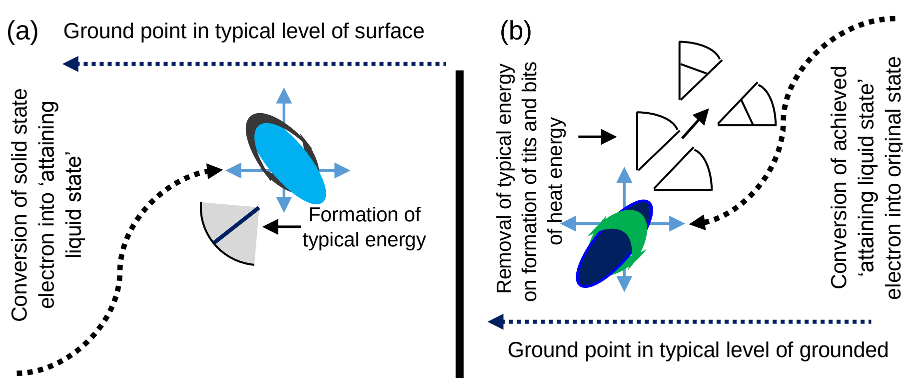

Figure 4: (a) a typical energy in arc shape is configured along with the anti-clockwise tilting of left-positioned electron to the centre of its hypothesized natured atom when converting it from solid state to

achieve an 'attaining liquid state', where orientation under the exerting force is ~40° to ~5° left, and under neutral force is ~5° to 0° left, and under exerting force is 0° to ~40° right from normal line drawn to its centre and (b) removal of typical energy in the form of tits and bits of heating on restoring achieved 'attaining liquid state' to solid state under self-driven orientation and potential energy of electron (~40° to 0° right, 0° to ~5° left and ~5° to ~40° left)

The round side of arc-shaped typical energy introduces (causes) the cooling effect. However, the tips of formed tits and bits from arc-shaped typical energy introduce (cause) the heating effect. Restoring original positions of electrons within clamped energy knots, they tilt under the established self-driven orientation force and potential energy, which is as per built-in scheme of their atoms in gas or solid elements. In both cooling and heating processes of gas atoms and solid atoms, electrons preserve even the exertion of force under highly controlled manner, so they neither deal with an elongation process, nor with a deformation process. Energy knots clamped electrons deal with their original elastic behaviors. The self-driven orientation force and potential energy of electrons in gas and solid atoms restore states from 'attaining liquid states' are under the naturally available elasticity of their energy knots.

Hence, the issue of entropy and irreversible process (in Carnot engine) to get 100 % efficiency is mainly related to neutral exertion of force along with ~5° left from normal lines drawn to centers of left-positioned electrons in atoms of solid and gas, and along with ~5° right from normal lines drawn to centers of right-positioned electrons in atoms of solid and gas. However, these orientations are from the north sides of electrons in gas atoms and south sides of electrons in solid atoms. This indicates that thermodynamics requires further investigations on fresh grounds.

Involved 'E_T' introduces the execution of achieving liquid transition of gas and solid atom by orientational force of distinct behavior, which in fact keeps controlling electrons clamped within energy knots while undertaking infinitesimal displacements. Atomically precise gold nanoclusters in pre-determined size and structure could be possible under the detailed analyses of varying temperature in the course of their synthesis [14]. An exertion of force in amalgamation of nanoscale and micron-sized components is discussed [15]. Due to the different orientational forces of electrons in atoms of differently positioned tiny-shaped particles, they develop particles of different geometrical shapes [16]. Atoms at work reveal the charge[d] dynamics [17]. To describe the structure, on-going research activities should also consider dynamics in addition to entropy and geometry [18].

'E_T' is a kind of heat energy, so it is also in the form of tits and bits. However, due to varying number of tits and bits in each transition state of an electron (or atom), it is also related to 'E_T'. In the gas atom, 'E_T' is stated to remain involved in a gaining manner where electrons undertake gas state to achieve an 'attaining liquid state'. In the solid atom, 'E_T' is stated to remain involved in an absorbing manner where electrons undertake solid state to achieve an 'attaining liquid state'. 'E_T' of a solid atom is related to several tits and bits of heat, which is absorbed by it to move electrons upward under infinitesimal displacements in an orientational manner. 'E_T' of a gas atom is related to several tits and bits, which is gained by it to move electrons downward under infinitesimal displacements in an orientational manner.

Tits and bits are the broken pieces of a bit energy. They are the results of division of unit photon energy that divides it into several parts. When tits and bits of heat energy transform into arc shaped typical energy, an element of force is enclosed by their wrapping energy. A unit photon gives energy of two bits, and a smallest overt photon gives energy of four bits [2]. Tits and bits of a bit energy nearly diminish their element of force, which a unit photon (or overt photon) does not do. The definition of change in energy (ΔQ) of atoms is related to both heating and cooling. The usage of '$mc\Delta T$' also requires re-defining and re-evaluating.

When heating is the case, electrons of clamped energy knots in suitable solid atoms move downward by tilting under the established self-driven orientational force and potential energy. A cooling is the case when electrons of clamped energy knots in suitable gas atoms move upward by tilting under the established self-driven orientational force and potential energy. This way, their nanoscale and micron-sized components look for new investigations, where not only entropy, geometry and dynamics are required to express structure but orientation also.

3. Conclusion

While transition of a gas atom to achieve an 'attaining liquid state', a transition energy remains involved in a gaining manner. While transition of a solid atom to achieve an 'attaining liquid state', a transition energy remains involved in an absorbing manner. As in transition state of gas atom, electrons move down by tilting, where a levitational force engages to control the specific orientations of electrons. As in transition state of solid atom, electrons move up by tilting, where a gravitational force engages to control the specific orientations of electrons. These principles give new equations of the change in internal energy of gas and solid atoms. In the resultant equations of gas atoms in attaining liquid states and restoring those states, the introduced orientational forces exist because of the levitational behaviors of electrons. In the resultant equations of solid atoms in attaining liquid states and restoring those states, the introduced orientational forces exist because of the gravitational behaviors of electrons.

Under transition energy in the gaining manner, a levitational force exerting at electron level is being controlled in the suitable atom of gas behavior introducing an 'attaining liquid state'. To reinstate the original state, a gas atom obeys the reverse process under the established orientational force and potential energy of electrons. Hence, the atoms of gas behaviors formulate different equations of change in internal energy.

Under transition energy in the absorbing manner, a gravitational force exerting at electron level is being controlled in the suitable atom of solid behavior introducing an 'attaining liquid state'. To reinstate the original state, a solid atom obeys the reverse process under the established orientational force and potential energy of electrons. Thus, atoms of solid behaviors also formulate different equations of change in internal energy.

Electrons of gas and solid atoms self-restore their orientational force and potential energy when they are recovering states from their achieved 'attaining liquid states'. This is according to permissible (natural) limits of contraction and expansion of energy knots.

When a gas atom takes transitional behavior by gaining transition energy, it deals with the accomplished work by itself. When a solid atom takes transitional behavior of state by absorbing transition energy, it does not deal with the accomplished work by itself. A different execution of work by gas and solid atoms opens new windows for research. Derived equations of change in internal energy also open new areas of research, both experimentally and theoretically.

On decreasing the levitational force of gas atoms for them to come into the attaining liquid state, left-positioned electrons tilt to right (clockwise) and right-positioned electrons tilt to left (anti-clockwise) under controlled orientations. This process of tilting is from north sides of the electrons. On decreasing the gravitational force of solid atoms for them to come into the attaining liquid state, left-positioned electrons tilt to right (anti-clockwise) and right-positioned electrons tilt to left (clockwise) under controlled orientations. This process of tilting is from south sides of the electrons. (‘Attaining liquid state’ of an electron or atom is considered just prior to achieving its liquid state, which is at orientation ~.40° instead of ~.50°).

A typical energy of arc shape is configured along with each trajectory of electron in suitable atom of gas behavior. Electrons while reinstating original state from achieved ‘attaining liquid state’ give away their configured typical energy in the form of cooling depending on the suitability of their gas atoms. The removal of typical energy of cooling by maintaining shape is due to its eccentricity. However, in case of suitable solid atom, the recovering of electrons to original state give away configured typical energy of arc shape in tits and bits form, and resultantly dealing with a typical nature of heating. The removal of typical energy in tits and bits of heating when not maintaining the shape is due to its conventionality. To observe the cooling and heating process, transitions of states in respective atoms of gas and solid behaviors occur in uninterrupted manners. This shows that orientation is crucial to maintaining energy and force in related phenomena and processes.

Research on the formation of typical energy by the controlled orientation of electrons in both gas and solid atoms can play central role in the current challenges in energy and health sectors. Further research is needed to explore the new principles of thermodynamics in atoms, molecules and different clusters.

Studies of solid atoms while in transition, elongation or deformation behavior may introduce new chapters. Studies of gas atoms while in transition, condensation or squeeze behavior may also be investigated on fresh grounds. Such investigations are applicable in thermodynamics along with other allied fields. The studies of transition, elongation or deformation, and condensation or squeeze behavior may start from atom scale to any higher scale or higher scale to any lower scale.

References:

1. M. Ali, Atoms in Gaseous and Solid States. (2020), https://www.researchgate.net/publication/323723379
2. M. Ali, Heat and Photon Energy Phenomena: Dealing with Matter at Atomic and Electronic Level. (2017), https://www.preprints.org/manuscript/201701.0028/v10
3. M. Ali, Atoms of None of the Elements Ionize While Atoms of Inert Behavior Split by Photonic Current. (2020), http://arxiv.org/abs/1611.05392v23
4. M. Ali, Atomic Structure and Binding of Carbon Atoms. (2019), https://www.preprints.org/manuscript/201801.0036/v10
5. M. Ali, Structure Evolution in Atoms of Those Elements Executing Confined Inter-State Electron Dynamics. (2020), http://arxiv.org/abs/1611.01255v22
6. M. Ali, I –N. Lin, Formation of tiny particles and their extended shapes: origin of physics and chemistry of materials. *Appl. Nanosci.* 9 (2019) 1367-1382.
7. M. Ali, I –N. Lin, Controlling morphology-structure of gold tiny particles, nanoparticles and particles at different pulse rates and pulse polarity. *Adv. Nat. Sci.: Nanosci. Nanotechnol.* **2019**, 10, 025015.
8. M. Ali, Nanoparticles-Photons: Effective or Defective Nanomedicine. *J. Nanomed. Res.* **5** (6), 241-243 (2018).
9. M. Ali, I –N. Lin, Phase transitions and critical phenomena of tiny grains carbon films synthesized in microwave-based vapor deposition system. *Surf. Interface Anal.* 51 (2019) 389-399.
10. S. C. Glotzer, M. J. Solomon, Anisotropy of building blocks and their assembly into complex structures, *Nature Mater.* 6 (2007) 557-562.
11. 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.
12. M. Ali, I –N. Lin, C. -J. Yeh. Tapping Opportunity of Tiny-Shaped Particles and Role of Precursor in Developing Shaped Particles. *NANO* 13 (7) (2018) 1850073 (16 pages).

13. M. Ali, E. Hamzah, M. R. M. Toff. Hard Coating Deposits: Incompatible Working Energy and Forced Behaviors of Gas and Solid Atoms. (2019), https://www.preprints.org/manuscript/201802.0040/v10
14. T. Chen, Q. Yao, X. Yuan, R. R. Nasaruddin, J. Xie. Heating or Cooling: Temperature Effects on the Synthesis of Atomically Precise Gold Nanoclusters. *J. Phys. Chem. C* 121 (20) (2017) 10743-10751.
15. M. Ali, I -N. Lin. Forcing or Forced Exertions in Amalgamation of Nanoparticles and Particles inside the Solution. (2020) ChemRxiv, https://doi.org/10.26434/chemrxiv.9823625.v3
16. M. Ali, I –N. Lin. Nucleation and Structural Identification in Gold Particles of High Aspect Ratios Developed through Mechanistic Approach. (2020) ChemRxiv, https://doi.org/10.26434/chemrxiv.11475300.v2
17. C. Kisielowski. Observing Atoms at Work by Controlling Beam–Sample Interactions. *Adv. Mater.* 27 (2015) 5838-5844.
18. V. N. Manoharan. Colloidal matter: Packing, geometry, and entropy. *Science* 349 (2015) 1253751.

Author's biography:

Mubarak Ali graduated from University of the Punjab with BSc (Phys & Maths) in 1996 and MSc Materials Science with distinction from Bahauddin Zakariya University, Multan, Pakistan (1998); his thesis work completed at Quaid-i-Azam University Islamabad. He gained PhD in Mechanical Engineering from the Universiti Teknologi Malaysia under the award of Malaysian Technical Cooperation Programme (MTCP;2004-07) and postdoc in advanced surface technologies at Istanbul Technical University under the foreign fellowship of The Scientific and Technological Research Council of Turkey (TÜBİTAK, 2010). He completed another postdoc in the field of nanotechnology at the Tamkang University Taipei (2013-2014) sponsored by National Science Council now M/o Science and Technology, Taiwan (R.O.C.). Presently, he is working as Assistant Professor on tenure track at COMSATS University Islamabad (previously known as COMSATS Institute of Information Technology), Islamabad, Pakistan (since May 2008) and prior to that worked as assistant director/deputy director at M/o Science & Technology (Pakistan Council of Renewable Energy Technologies, Islamabad, 2000-2008). He was invited by Institute for Materials Research, Tohoku University, Japan to deliver scientific talk. He gave several scientific talks in various countries. His core area of research includes materials science, physics & nanotechnology. He was also offered the merit scholarship for the PhD study by the Higher Education Commission, Government of Pakistan, but he did not avail himself of the opportunity. He also earned Diploma (in English language) and Certificate (in Japanese language) in 2000 and 2001 respectively, in part-time from the National University of Modern Languages, Islamabad. He is the author of several articles available at following links; https://scholar.google.com.pk/citations?hl=en&user=UYjvhDwAAAAJ, https://www.researchgate.net/profile/Mubarak_Ali5, https://www.mendeley.com/profiles/mubarak-ali7/, & https://publons.com/researcher/2885742/mubarak-ali/publications/