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Extended Abstract

Nano science, Nanotechnology, Graphene & 2D material: Chinese Taiji and Nanascience and Quantum Mechanics- Alex Kung-Hsiung - National Pingtung University of Sci. & Tech, Taiwan

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Abstract

The God said in the beginning was the Word, and the Word was with God, and the Word was God. He was with God in the beginning. (John 1:1). Chinese Laozi said Way that can be spelled out. Cannot be the eternal way. Names that can be named. Must change with time and place. ???Emptiness??? is what I call the origin of heaven and earth. ???Existence??? is what I call the mother of everything that had a birth. (The book of Way, or the book of Daodejing) Chinese Dao is the same with the word in Bible. The book of EA or Changes said, in the system of EA there is the Great Ultimate, it generates the two Modes (Yin and Yang). The two Modes generate the four Forms. The four Forms generate the eight Trigrams. The eight Trigrams generate the sixty four divinatory trigrams or phenomena. EA has three essential properties, say easy, ever-changes, and non-changes. Appreciate emptiness from Taiji, that we may see nature of the Way???s versatility. Appreciate existence, that we may see the extent of the Way???s possibilities. These two, Emptiness and Existence, came from the same source. The micro observation of the world from the view of the Chinese Taiji matched with the Quantum mechanics. The quantum entanglement can be described by Yin-Yang Taiji, and the quantum superposition can be described by eight Trigrams. The Nano science application can be enriched by Quantum mechanics and Taiji philosophy likes quantum computer, quantum telegraph, and quantum medicine.

In the last quarter of the century, fullerenes became one of the dominant discoveries in the field of physical chemistry. Fullerenes are a new allotropic form of carbon. Research on them has contributed to a huge number of scientific publications and their use is restricted by several hundred patents. In the year 1996, three explorers, Harold Kroto, Richard Smalley and Robert Curl, received the Nobel Prize in this field of chemistry, which confirmed the importance of this kind of science.1 Not so long ago, it was thought that coal occurs in two allotropic forms that differ in their crystal structure, namely, diamond and graphite, but in 1985, the above-mentioned scientists revolutionized knowledge about carbon and discovered a new allotropic variety, a caged form of carbon.2 The crystal structure of fullerenes is completely different from graphite and diamond, since it is made up of C60 and C70 carbon molecules. There are two fundamental differences between graphite, diamond and fullerenes. The first two mentioned varieties of carbon occur in atomic form, while fullerenes are its molecular form. In the crystalline networks of diamond or graphite, peripheral atoms are saturated with other elements, most often more reactive hydrogen; so, formally, carbon in these varieties does not occur in pure form. Fullerenes, on the other hand, are a variety of pure carbon. The discovery of fullerenes and the enormous development of research in this field have led to increased knowledge about carbon nanostructures. At the beginning of the 90s, carbon nanotubes (CNTs), carbon nanocrystallites with onion structure and carbon nanocapsules were discovered. Nanotechnology is an absolutely new quality in technology and, at the same time, it is something so different that it cannot be compared to anything else. It is an action in the world of small objects with sizes reaching individual molecules of chemical compounds. The smallest objects which man had dealt with were located on a micro-scale, which means that they were described in millionth of a meter. This was practically enough to deal with the anatomical description of the cells of living organisms and some of their structural parts. A limitation of the study of smaller structures was the resolution of optical microscopes. After the invention of the electron microscope in 1931, it became possible to distinguish two separate points even closer together. Nanotechnology can be defined as a science dealing with objects for which the smallest elementary particle does not exceed 100 nm even in one plane size is, in fact, comparable with the size of macromolecules such as enzymes or receptors (about 5 nm) and is smaller than the human cell, whose size is estimated at 10,000–20,000 nm

Fullerenes are (besides graphite and diamond) the third allotropic form of carbon. This name covers the entire family of molecules with the general formula C2n (n.16), in which the surface of the solid is built of only carbon atoms, located only on its surface

Among the large fullerene family, fullerenes containing 60 or 70 carbon atoms are the most widespread and, at the same time, the best-known ones. Studies of carbon clusters by mass

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spectrometry show that the "carbon ball family" is almost infinitely large. The knowledge of higher fullerenes is quite limited due to their much lower availability. The most popular fullerene, containing 60 carbon atoms (the Buckminster fullerene C60), has the shape of a truncated icosahedron, that is, it looks exactly like a football. C70, on the other hand, has an additional ring of carbon atoms and it is the best-known higher fullerene. Compared to C60, its molecule has a hexagonal ring band attached to the middle, which reduces the symmetry of the fullerene cage. C70 has an ovoidal structure and has physicochemical properties similar to C60.

Due to its spatial structure, the fullerene molecule C60 enjoys the greatest attention from scientists and it is considered to be an "ideal" structure C60 fullerene molecule has the shape of a spheroid, or more precisely a truncated icosahedron, which has 60 vertices, each constituting one carbon atom . According to the theoretical proof of L Euler, a symmetrical solid with C20+2n vertices must be enclosed by 12 pentagons and n hexagons. The smallest carbon cluster that meets this rule is C60 and its particles have a diam eter slightly greater than 1 nm. Each of the C60 fullerene carbon atoms is surrounded by an identical environment; therefore, all atoms are equal and the molecule does not contain weak points of chemical interactions. Although the wrapping of the graphite layer in the carbon cage is accompanied by stresses, thanks to symmetry, they are distributed evenly across the molecule. C60 molecules have a symmetrical structure and, thanks to that, they are extremely durable.

The results of research on the synthesis of endohedral fullerenes with uranium proved to be a surprise. The formation of a stable U @ C28 structure was proved, and also, model calculations showed that C28H4 fullerene having four external hydrogen atoms should be a very stable structure. Thus, the search for the smallest fullerene that can bind some chemical outside or inside the atoms of its cage seems to be an extremely important task.

The creation of new nanoobjects requires a special understanding of the properties of nanoparticles, and because the carbon allotropy has a dominant role in nanodomain, both for theoretical reasons and their further applications, zero-, one-, two- and three-dimensional carbon-based structures were studied, such as fullerenes, nanotubes, graphene, spongy carbon and hyper-diamonds. As nanostructured functional materials, inorganic compounds such as silicates, borates, selenides, sulfides and oxides have also found several applications. Action at the molecular level has led to the development of nanotechnology in many areas such as material engineering, chemistry, biology and cosmetic area, but in pharmacology and medicine, and quantum computing, it can be useful in providing the theoretical background for new syntheses and applications. Properties of fullerenes result mainly from their aromatic character.

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