

Intelligibility of Nature IV

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EXPLORING NATURE OF” SELF-ASSEMBLY” IN NANO-MATERIAL SYNTHESIS

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MIRROR –Image Replication in a Globe

<http://www.camelotdw.com/fa/pastel/images/dalicrball.jpg>

Premise:

The next generation of nano-materials are based on the self-assembly of periodic building blocks synthetic of nanostructures. The precision of replicant self-organization processes is a very useful method for manufacturing nanoscale devices. But despite excellent advances in nanoscale fabrication of a wide range of organic and inorganic building blocks (atoms, clusters, radicals,..) of various sizes and shapes, the control over their assembly into ordered structures, remains the main obstacle to the bottom-up manufacturing of these novel materials and devices.

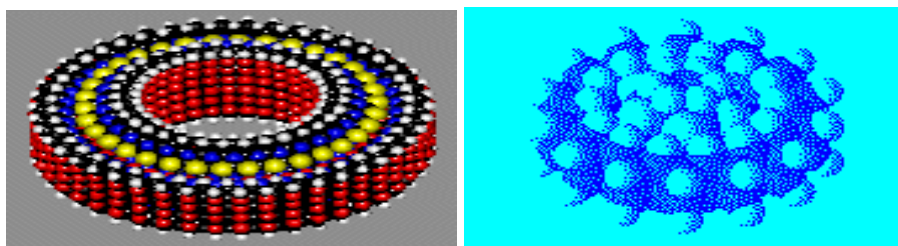
A model to study the self-assembly of nanoparticles within discrete, attractive interaction sites, is based on computer simulations of the organization of basic building-blocks to simulate the path of change from a disordered state into unique geometric forms such as chains, sheets, rings, square, pyramids etc.., In computer simulation, the supposition is that the building blocks embody a “**mirror-like**” replication process of information; this admission is made without going in a deep theoretical approach about the origin of the self-replicating system. This simple hypothesis that admits the existence of some *mirror –information* function, that permits carrying out the molecular “*self assembly*” in order to build up replicant structure and function on the nanometer scale, suggests the need to provide a theoretic-route to understand how it can be possible to control the “*self-assembly*” of building blocks into precise and predictable forms and structures.

”**molecular manufacturing of nanoscale-bearings** ” : <http://www.zyvex.com/nanotech/images/bigBear.mpg>

“One layer of graphite used as lubricant (jellow circle) allows the bearing to rotate”:

<http://www.zyvex.com/nanotech/images/planGearBig.gif>

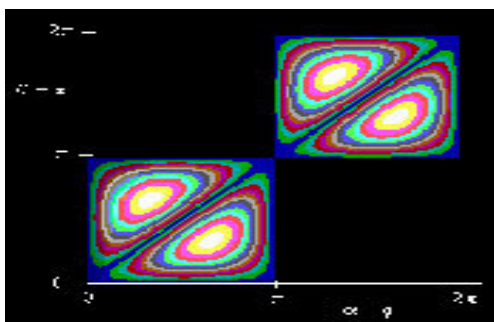
<http://www.zyvex.com/nanotech/nano4/whitesidesAbstract.html>



<http://www.zyvex.com/nanotech/bearingProof.html>

Therefore “*self-assembly*” methods in nanoscale construction, pose a number of substantial and crucial challenges, aiming to find a better *intelligibility* of the working functions, and in order to design and to control the shape of supra-molecular structures, that interplay covalent with non-covalent bonding, in a way to achieve an efficient and low cost nanofabrication, through a better understanding of the “*self-replication*” process of information.

Chemical “*affinity*”, is the fundamental reason to link atoms in order to form and transform molecular arrangements, (1) in fact chemical reactions are mostly a choosy process of breaking bonds of reactants to making new bonds of products. This double transformation in out of equilibrium chemical transformation’s dynamics, do not requires only a balance of *exothermic / endothermic* exchanges of heath. This is because the process needs a selective *attracting/repelling* power, named from the alchemic times, “*affinity*”, that permits control of the simultaneous “*self-catalytic*” process to go from chaos to a new functional order of products construction.

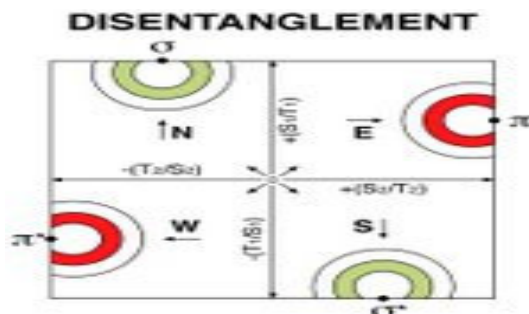


<http://www.ildiogene.it/EncyPages/Ency=entanglement.html>

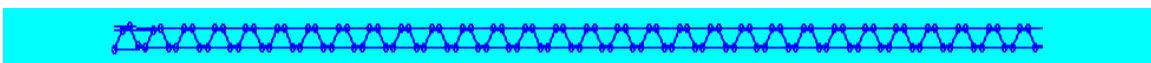
“*Entanglement / disentanglement*” of quantum states transition (2), plays a determinant role in the *simultaneity* of development of two processes, e.g. to breaking old bonds and reproducing new covalent bonds in the same shell of space time. The last in fact is working as a *quantum-cavity*, where it can be possible to realise a loop of “*non-local information energy* “. This *periodic loop* of simultaneity of information is the basis to control the selective performance named “*affinity*”. This conception, so intuitively acquired by ancient alchemy, to day in the mechanical science paradigm, represents a deeply misunderstood reality, because a modern reinterpretation of “*affinity*”, before all, needs to conceive a dissolution of the linearity of time flow.(3) The nature of *non-linear time flow* in the *entanglement* effect can be determined through the interpenetration through molecular collision of two valence electron-clouds liveing in the same bonding space-time domain. In this dynamic impact, the waves associated with the bonding electrons destroy though “*destructive interference* of an *out-of-phase superposition*”, the pulses directed along the bonding-coordinate (4). Therefore the *entangled valence-shell*, assumes a “*flat dimension in space and the internal time becomes split into two vectors*. This *non-Euclidean* structure of space time that is composed by a bit of Space’s vectors and a bit of Time’s vectors, is typical of the “*non-local*” *Information*

Energy, able to show “simultaneity”, in a mutual communication limited to the information bonding domain, where the dynamic process of “self-organization” in chemical transformation takes place. Therefore likely to the change of frequencies in a “particle in a box”, the changes of bonding, in a chemical reaction, is a consequence of the changes of the forms of associated waves, driving the valence electrons to form new bonds. Therefore the changes of bonding is not only a consequence of the vicinity in space of covalent electrons, it is because their negative charge, the valence electrons, do not prefer to remain so near, as it is previously assumed by covalent bond theorists.

Now the changes of the driving waves in defining the bond’s transformations is much easier to understand, interpreting the emergent “self-organization” by the means of identifying qualitatively rather than quantitatively, the process of “disentangling entanglement” of pure waves associated with valence bonding electrons. In fact, the “disentanglement” is the collapse of two entangled waves after the critical inversion point of the flux of transformation during the chemical reaction out of equilibrium dynamics. “Disentanglement” works as a dissociation activity that split the entangled waves in four polarized pulses spread in a bi-dimensional space time grid. (see following graphic representation)

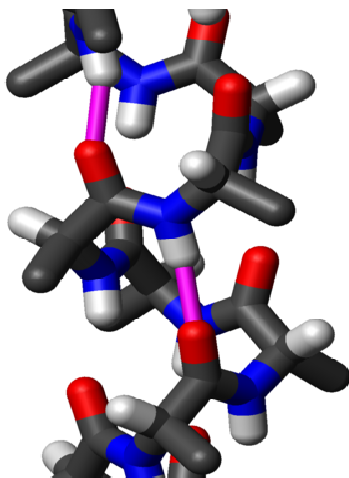


The four different polarized non-linear pulses or “Solitons” (5), are indicated in the above graphic with the capital letters <North, South, East, West> in relation to the proper vector-directions. “Solitons” are solitary wave (wave single packet or pulse fractals) that near to the new equilibrium, rapidly generate different triadic vector’s aggregation to build up, though positive pulse interference, one of the possible 3-Dimensional Covalent Bonds known as belonging to the vertical and horizontal topologies of bond and anti-bonding shell’s. The above triadic reassembling among three of the four “Solitons” therefore, lets free one of the “Quantum Pulses” for each bond formation. The remaining “Soliton” corresponds to a liberated emission of a “non-local information energy”, able to maintain, for a relative long time and distance, the property of “simultaneity of information communication” during the “self-periodic-construction” process of various molecular forms. Therefore, “disentanglement” action is of vital importance to understand, how a “Quantum Information Replicative Processing”, during the non-equilibrium transformation, can be conceived as the result of a coherent phenomena of bonding construction, happening in real time with the remaining activity to hook and join new bonds for developing successive polymeric proliferation, driven by the disentangled formation of Soliton’s patterns, generating new molecular bonds formation into a system of “self-organization” of bio-chemical transformations.



<http://www.math.h.kyoto-u.ac.jp/~takasaki/soliton-lab/gallery/solitons/sg-kink-antikink-a.gif>

“Solitons “ derived by the *Disentangling the Entangled waves* associated with valence electrons, permits a vector-system composition, that is useful for understanding the generation of “morphogen patterns” that develop the bonding-forms of molecules.



<http://www.answers.com/topic/davydov-soliton>
Solitons weak interactivity (In Violet.)

Furthermore, “*Solitons non-localised interactivity*”, acts as “*information energy*”, to define and to replicate the composition and the polymeric periodic duplication of molecular bonding and also can be utilised as weak force able to sustain helix formation in complex molecular structure.

Evidently it is argued that this suitable “*morphogen's activity*” should attempt to satisfy other specific conditions and rules based on the search of a minimum of Matter-Energy interactions, but certainly the “*Model driven by the Soliton's triadic bonds's composition, plus one free Soliton usefull to hook and to join and to reply in an simultaneity informational activity the growing up in each polymeric system*”, can be functional also in understanding the construction of various forms and symmetries of molecules.

At a glance, the molecular collision causing the rupture of reagent's bonds, degrades the binding energy into heat, which disperses over all the directions of the reaction environment. At the same time, “*quantum waves*” associated with the “*valence electrons*”, penetrating between themselves (*entanglement*), produce “*information energy*” with a “*non-local*” character, which collapses (*disentanglement*) in the form of “*solitons*”, splitting in four “*directional driving orientations*”. Therefore, those “*solitons*”, become the basis of the process of “*self-organization at a distance*”, acting to improve the re-composition of the new bond's products of the bio-chemical reactions. Therefore during each reaction, working in conditions far from equilibrium, there is implemented a process of minimization of bond's energy, and at the same time, there is developed a parallel process of transformation, carrying the previous bonding energy versus a maximum of “*information energy*” production, in order to implement a “*self-organization*” process, as it is necessary to realise the transition between chaos forward to a new order of molecular products of the reaction.

Finally this “*Model of self-organization*” (6), promises to provide crucial results for complex living systems other than the inorganic molecular construction. In fact, the development of these “*morphogenetic model*”, will form the bulk of the future research program about the procedures of “*self assembly on life- nanotechnology*”, owing the no local information interactive transcriptional properties of polarised “*Solitons*”, arising from the possibility to communicate “*in a non linear time*” without distortions, weak “*information energy*” over relative long timing and distances.

The Role of Nano-Art in the Changing of Scientific Concepts.



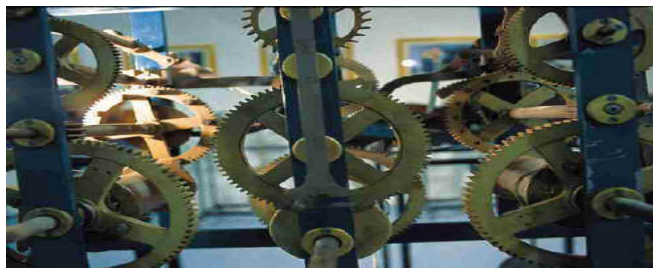
http://mx.nthu.edu.tw/~rklee/rklee.files/pic_3.gif

“*Self-organization*” happen through the non linear timing process of interpenetration (“*entanglement*”) of quantum waves that join each other generating by means of disentanglement *Soliton’s patterns*, having complementary “*non-local*” properties of communication of “*information energy*” driving molecular reproductive morphogenesis.

The conceptual premise of the interpretation of “*molecular morphogenesis*”, given here, is based on the understanding of non-linear space time changes. The space-time transformation is considered a “*mental operation*” so that it is not only a question of science understanding, because the consequent problem of developing a new mentality in science will explore a great range of cultural correlation related with the “*self-organization*” and a general problem of paradigmatic change of mechanical science that includes also the metamorphosis of living systems.

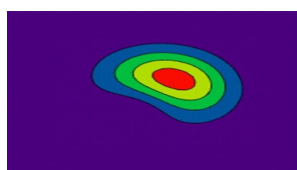
Contemporary artists are greatly involved in giving a contribution to a mental change particularly focused on nano-technologies representation in relation to the self-organization - related to the developmental changes of molecular morphogenetic fields. (8), (9) .Besides, it useful to underline that sometimes, science representation in coloured computer simulations is very beautiful, as well as some examples shows below . Therefore this, the beautifulness of science imaginary through the computerized invisible world, acts as an attractor between contemporary artists and scientists.

In particular nano-technological methods of “*self assembly*”, push forward the scientific and artistic creativity to join in the development of new strategies to nanofabrication. In fact the understanding of the “*Self-Assembly*” requires to overcome the logical construction going beyond the mechanical macroscopic structures, governed by direct contact of the mechanical parts in motion.



http://www.fi.cnr.it/r&f/n22/ist_fisicacosmica.htm

Henceforth, starting from the general need to diverge from mechanical science understanding in order to explore new cognitive open strategies, to be conceptually free from the influences of reductive mechanistic thinking, recently born in Florence, an ***Entangling SCIENCE & ART creative movement***, established with the idea to restore, in the contemporary era, the trans-disciplinary vicinity of art and science that was the fundamental character of the antique Florentine

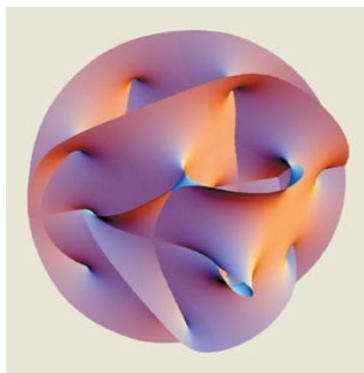
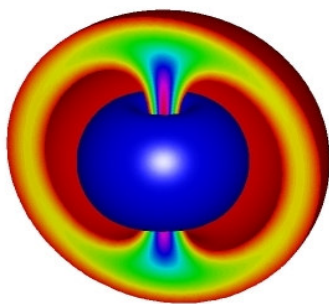


Renaissance. (10)

“Interference frame”

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- (4) -Destructive Interference Example: <http://www.cst.com/Content/Applications/Article/9>
- (5) – Solitons : <http://en.wikipedia.org/wiki/Soliton> , <http://www.ma.hw.ac.uk/solitons/> ;
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- (9)- Nano art Gallery : <http://www.welcome.ac.uk/node5956.html> ; <http://www.nanoart21.org>.
- (10) Open Network for New Science & Art : www.egocreanet.it



“SOLITON” www.acqao.org/gallery.htm Multidimension- Calabi-Yau Space