Paper describing the Dimensional Design Technology

ENERGETIC ASPECTS OF INFORMATION STORAGE

Glen Rein, Ph.D.
Quantum Biology Research Lab
Northport, NY

The goal of this article is to examine, validate and explain the scientific concepts and terminology used in the promotional literature of Dimensional Design. In some cases the concepts will be elaborated in a more rigorous scientific manner and in other cases specific scientific research findings and references will be quoted to support the claims.

Dimensional Design Technology

At the heart of all Dimensional Design technology is the concept of information storage. The encoded information is described as a "vibrational program composed of specific frequencies". The encoded information is believed to be permanent and not susceptible to electromagnetic fields (EMF) in the environment or other environmental stressors like extremes in temperature and noxious chemicals. A second fundamental premise of all Dimensional Design products is that they emit a coherent quantum information field which has a variety of effects, depending on the specific product. In the case of the ClearLine Protection Technology, for example, the quantum field is believed to resonate with EMFs from electronic devices. As a result of such an interaction, artificial EMFs are brought into a new coherent order. The EMFs are stabilized thereby altering the way they interact with biological systems.

The quantum field generated from Dimensional Design products is also believed to interact with EMFs of the body making them more ordered, restoring their healthy qualities and balancing their flow. In this case, the newly imposed order makes them balanced in the sense that their negative biological effects are neutralized and their positive effects are amplified. Balancing the EMFs of the body is believed to "filter down" to have positive organizing effect on the physical body and its biochemical components.

The Dimensional Design technology allows information to be stored in a variety of "carrier" materials including matter (solids and liquids) and electromagnetic energy fields. In the case of solids, some products use multiple layers comprised of an aluminum-doped plastic polymer layer and a holographic circuit layer. Imprinting information into an electromagnetic field has been achieved with the AcuZone Laser and into a non-electric hologram in the ClearLine Protection technology. To understand how these achievements are possible, let us first examine more conventional forms of information storage.

Magnetic Information Storage

Classical magnetic information storage technology used in contemporary computers, as random access memory (RAM), is based on ferromagnetism (Jiles, 1991). The bits of information, which are stored on computer disks, are created by coating surfaces with ferromagnetic materials in concentric circular tracks. The ability of the sensor head to write or store the bits of information is based on its magneto-resistive properties. The sensor head first emits an external magnetic field which magnetizes a small part of the disk to create each bit. Information is stored or encoded as transitions which are changes between two bits magnetized in different directions. The sensor head detects the orientation of the magnetic particles by measuring the magnetic fields they emit. When the transition between two adjacent bits is perpendicular a “1” is registered by the sensor. The absence of a transition is measured as a “0” when two adjacent bits are written in the same direction. Therefore, modern computers have a binary information storage capacity. From an energetic point of view, the input into such a system is an externally applied magnetic field and the output is also a magnetic field generated from the stored information.

In order to increase the information content of a disk, the bit length (width of a given circular track) must be decreased. In an effort to reduce the size of the magnetic domains, recent research has focused on the use of arrays of nanomagnets and various nano-imprinting methods. Solid state magnetic memory is achieved in these new devices because nanomagnets retain their ability to create two oppositely magnetized states which can store binary data (Kirk, 2000). Nonetheless, even in these ultra-high density storage systems, the input and output of the system is a magnetic field.

Therefore, magnetic information storage devices function in a similar way as technology used by Dimensional Design. In order to store and retrieve information in both systems, energy fields are used for the input and output. In the case of Dimensional Design, although the input energy is a trade secret, the output energy is described as a quantum energy field (discussed below).

Optical Information Storage

New technology now exists which uses magneto-optical techniques, where the output and input of the system is visible or infra-red laser light (Reif, 1991). The use of high powered lasers allows the storage of megabits of information with a single laser pulse. Using this technology, information can be written by exposing a polymer substrate to a laser beam and a magnetic field; the magnetic field alters the magnetic flux of the optical polymer, thereby creating a reflective and a non-reflective state in the polymer. Therefore magneto-optical information is binary in nature like magnetic information storage. The binary information stored in the polymer can then be read using a photon detector which measures the reflected light or not. There is a critical relationship between the size of the information bits (the distance between the reflective and non-reflective regions) and the wavelength of the laser light used. As with magnetic information storage, current research is focusing on enhancing optical memory capacity by adding additional polymer layers and decreasing the size and spacing of the information bits. The technology which uses multiple layers of stored information is called Magnetic Super-Resolution (MSR). In MSR technology, the information is stored on the lowest layer in a high density format and then copied to a higher layer and stored in a low density format, so it can be more easily read. Nonetheless, in all variations of this technology, the input and output energy is always a laser light. Again we can draw parallels to Dimensional Design technology which also uses energy, although a different type, to store and read information. Furthermore, Dimensional Design technology also uses multiple layers and describes the output energy as being coherent, like laser light.

Another parallel can be drawn between Dimensional Design technology and optical storage technology since both utilize holograms. Holographic memory, in the computer industry, is achieved using two-photon optical storage techniques (Hunter, 1990). Like traditional optical storage disks, this new technology uses lasers to imprint information, but unlike magneto-optical recording, which uses ferromagnetic materials, two-photon optical storage uses fluorescent materials. In this case, the writing laser is intersected with a second laser with a wavelength which is the second harmonic of the first laser. The second laser fixes the data spatially and temporally. A third laser, using a different frequency, reads the information by causing the polymer to fluoresce. Thus, like the previously described optical storage disks, the holographic technique uses light to store and retrieve information. With holographic technology, the input is coherent light but the output is incoherent light which is detected by a charge-coupled device (CCD) chip. This example demonstrates the input and output energies can be different, which is likely to be the case with Dimensional Design technology.

An interesting variation of these technologies is the memory cube which combines both holographic and magneto-optical storage techniques. This technology doesn't use polymers doped with ferromagnetic material, but rather lithium niobate crystals (Mok, 1991). This offers the advantage of a three dimensional lattice structure, rather than a two-dimensional surface as in a polymer. In this case, two laser beams create a hologram on one plane inside the crystal. By changing the angle between the two lasers, information can be stored on different planes. The described phenomenon could explain how Dimensional Design technology can imprint information into the lattice structure of a three-dimensional object.

Another aspect of optical information storage technology can be used to explain and substantiate the claim of Dimensional Design that their products emit quantum energy. Through the use of layered optical storage media, it was recently discovered that there are unusual interactions between the individual layers. This anomalous behavior was recently observed at the interfaces between layers and explained in terms of nonlinear optical Second Harmonic Generation (SHG) (Reif, 1991). Under these specific conditions an unusual phenomenon occurs called space-inversion symmetry, where the normal symmetry associated with magnetization of the optical materials of the system is broken (Pavlov, 1997). Therefore, according to SHG theory in nonlinear magneto-optics, the second harmonic light that is emitted from the system is considered nonlinear. It is interesting to note that a similar situation has been described in four wave mixing experiments in phase conjugating systems, where under the right mixture of input lasers, the system is not only nonlinear, but emits a time-reversed longitudinal wave (Zozulya, 1994). Thus, in these nonlinear systems the presence of time-reversal and breaking of symmetry can occur. It is further interesting to note that according to quantum physics, both of these situations occur at the quantum level and are associated with the presence of quantum fields (Blumel, 1992). The surprising discovery of macroscopic quantum coherence (Garg, 1985) states that quantum phenomenon are not limited to the domain of subatomic particles but can also occur in much larger materials normally exhibiting classical Newtonian behavior. Taking all these observations together, it seems likely that under the correct conditions, a nonlinear quantum field can be emitted from a lattice structure capable of storing information. Such a conclusion validates the claim of Dimensional Design.

An interesting new approach in optical storage technology involves the use of bio-molecules incorporated into a polymer film (Chen, 2000). A recent study demonstrated permanent optical information storage using bacteriorhodopsin as the bio-molecule of interest because the lifetime of its excited state is several years. In this study information was written using a red laser, read using a yellow laser and erased using a blue-green laser. The use of bio-molecules instead of ferromagnetic chemicals is of particular interest in this discussion because some bio-molecules like tubulin (Jibu, 1994) and DNA (Bieberich, 2000) are believed to exhibit macroscopic quantum coherence. Therefore the use of such bio-molecules to store information would result in the emission of a quantum field as described in the Dimensional Design literature. In order to understand how quantum fields can be generated from such bio-molecules, we need to first examine more conventional molecular information storage.

Molecular Information Storage

As in magnetic information storage, where magnetic states of ferromagnetic compounds are used, electrochemical information storage is also being studied in biological systems. In this case, distinct oxidation states of certain complex chemicals are being used for multiple bits of information storage at the molecular level. In principle, the amount of information stored is directly related to the number of oxidation states obtainable. By converting the redox state of the molecules into electrical signals, the information can be easily read. This is accomplished by allowing the chemical complexes to self-assemble into monolayers on gold electrodes. This technology is an example of how, as used in Dimensional Design, different kinds of input and output stimuli (chemical input and electrical energy as the output) can be used to store and read information.

A variety of complex “triple-decker” complexes of ferrocenes and porphyrins have been recently synthesized which have four stable and distinct redox states (Gryko, 2000).

Similar results have been obtained with thiol-derived europium porphyrinic triple-decker complexes (Li, 2000). These molecular systems thus have four basic states, unlike magnetic information storage systems which only have two. Furthermore, the information storage density of the bio-molecular systems can be further enhanced by stringing together a large number of triple-decker building blocks into complex arrays (Clausen, 2000). Tailoring large bio-molecular arrays for desired multi-bit information storage systems is presently underway. This is another example of how we have learned to build systems which can store enormous amounts of information.

The genetic code is a prime example of how biological systems store an enormous amount of information at the molecular level. Biological information storage in DNA is based on a genetic alphabet. The information content is believed to be encoded in two base pairs (A and G or C and G) which hold the two strands together. In fact there is a special type of bond (the hydrogen bond) between the two base pairs which holds the DNA molecule together. Genetic information is encoded in the specific sequences, along the DNA, of the A-C base pair and the C-G base pair. The number of bits of information is directly related to the sequences of base pairs. The genetic information is then "read" by a complex series of interactions between DNA and special enzymes and proteins. The output of the system is the generation of a replicate strand of DNA (as in cell replication) or the generation of specific amino acids, which are then assembled into specific proteins. Deciphering of the information stored in the base sequences of the genetic code allows biological systems to survive. Although DNA uses a four letter alphabet, DNA is fundamentally a binary storage media for imprinting and retrieving chemical information.

Although DNA has a binary storage capacity, the information content in DNA is so vast we can only conclude that another mechanism, in addition to the known and previously described information storage mechanisms must be at work here. One example of the enormity of the information in DNA is the fact that DNA contains output information not only about specific amino acids and bases, but also about how these building blocks are organized into complex three dimensional (3D) bio-molecular structures. In order to understand and utilize the enormous information in DNA the new field of bio-informatics has developed which uses complex mathematical modeling, algorithm-based computer technology, DNA chips and cDNA microarrays (DNA coated microcircuits) (Roweis, 1998). A high-throughput sequencing ability is characteristic of this new sophisticated genomic computational technology.

Another example of the enormous information capacity of DNA is based on discoveries in the new field of computational genomics. It has recently been discovered that certain bio-molecules, like DNA, have the ability to perform mathematical computations in unexpected ways. A computational model has been developed which uses DNA to solve a complex mathematical problem known as a directed Hamiltonian path problem (Adleman, 1994). The solution to such problem is defined as a Hamiltonian path through a specifically defined graph. The novel approach which has been used with DNA represents each vertex and edge of the graph by a short strand of DNA with a chosen sequence of bases. Binding together a string of such strands in a chosen order results in a DNA molecule that encodes the solution to a Hamiltonian path problem. The input in this method involves choosing the right set of oligonucleotides. The output solution is generated by digesting the DNA molecule into billions of molecules, only one of which encodes a solution to the problem at hand. Although this method has so far only been used for one type of mathematical problem, it does demonstrate the enormous computational capacity and information density of DNA.

One possible mechanism to explain the enormous information capacity of DNA, in addition to its known binary storage system, attributed to it hydrogen bonds, is based on DNA's quantum properties. A particularly relevant quantum property concerning information storage is demonstrated by a special type of bonding energy. It has recently been discovered that in addition to hydrogen bonds between two separate strands, there are also quantum bonds between two bases within the same strand. Base to base stacking energy has been calculated for DNA using quantum theory and perturbation theory (Sponer, 1996). This bond is based on atomic charges and dipoles and has been associated with structural changes in the DNA molecule (Delcourt, 1991). Although these quantum bonds in DNA have not yet been connected to its information storage capacity, structural changes in DNA are related to another interesting quantum property of DNA.

This quantum property of DNA concerns its unique ability to emit energy in the form of coherent light (Popp, 1984). It turns out that the photons emitted after nuclear DNA is treated with a specific chemical (ethidium bromide) which causes its two strands to unwind, are thousands of times more coherent than any man-made laser. It has been proposed that this anomalous property of DNA is a result of some unknown underlying macroscopic quantum behavior (Rein, 1997). Since optical information storage systems, as well as Dimensional Design technology also emit coherent or quantum energy, it is likely that quantum properties of biological information storage systems (like DNA) contribute to their enormous storage capacity. These quantum mechanisms are likely to explain and validate the information storage in Dimensional Design technology.

A final claim about information storage in Dimensional Design technology can also be validated scientifically. Their literature describes information storage as a "vibrational program composed of specific frequencies". The concept described here of storing specific frequencies in a polymer lattice structure has in fact been scientifically demonstrated. This research demonstrates in that at least in the aqueous state (and likely in the solid state), a carrier, in this case water, retains the frequency information associated with an electromagnetic field for hours after the electromagnetic source is removed (Fesenko, 1995). The ability of water to store frequency information likely involves its ability to spontaneously form three dimensional clusters, but also involves its quantum properties (DelGiudice, 1988) Furthermore, like DNA, water can also store quantum information (Rein, 1992).

The results of these experiments indicate that many chemical and biochemical systems exist which act as a carrier for stored information in a stable format for long periods of time. Furthermore, the retrieved information can be in the form of a quantum coherent energy field emitted from the carrier. Furthermore, the interaction between quantum fields and classical electromagnetic fields, whether man-made of biological origin, has also been described scientifically. These scientific observations validate the claims of Dimensional Design about the energetic characteristics of their technology.

REFERENCES

Adleman L (1994) Molecular computation of solutions to combinatorial problems. Science 266: 1021-1027

Bieberich E (2000) Probing quantum coherence in a biological system by means of DNA amplification. Biosystems 57: 109-24

Blumel R, Smilansky U (1992) Symmetry breaking and localization in quantum chaotic systems. Phys Rev Lett. 69: 217-220

Chen F, Hou X, Li BF, et al (2000) Optical information storage of bacteriorhodopsin molecule film: experimental study. Mat. Sci. Engineering B76: 76-78

Clausen C, Gryko DT, Yasseri AA, et al. (2000) Investigation of tightly coupled porphyrin arrays comprised of identical monomers for multibit information storage. J. Org. Chem. 65: 7371-7378

Delcourt SG, Blake RD (1991) Stacking energies in DNA. J Biol Chem 266:15160-69

DelGiudice E (1988) Water as a free electric dipole laser. Phys Rev Lett 61: 1085-1088

Fesenko EE, Geletyuk VI, Kazachenko VN (1995) Preliminary microwave irradiation of water solutions changes their channel-modifying activity. FEBS Lett 366: 49-52

Garg A. (1985) Criterion for the observability of macroscopic quantum coherence. Phys. Rev., B Condens. Matter 32: 4746-4749

Hunter S, Kiamilev F, Esener S, et al. (1990) Potentials of two-photon three-dimensional optical memories for high performance computing. Applied Optics 29: 2058-2066

Gryko DT, Zhao, F, Yasseri AA, et al (2000) Synthesis of thiol-derivatized ferrocene-porphyrins for studies of multibit information storage. J. Org. Chem 65: 7356-7362

Jibu M, Hagan S, Hameroff SR et al. (1994) Quantum optical coherence in cytoskeletal microtubules: implications for brain function. Biosystems 32: 195-209.

Jiles D (1991) *Introduction to Magnetism and Magnetic Materials*, Chapman and Hall, London, p69-81.

Kirk KJ (2000) Nanomagnets for sensors and data storage. Contemp. Physics 41: 61-78

Li, J. Gryko D, Dabke RB, et al. (2000) Synthesis of thiol-derivatized europium porphyrinic triple-decker sandwich complexes for multibit molecular information storage. J. Org. Chem 65: 7379-7390

Mok FH, Tackitt MC, Stoll, HM (1991) Storage of 500 high-resolution holograms in a LiNbO3 crystal. Optics Letters 16: 605-607.

Pavlov VV, Pisarev RV, Kirilyuk A, Rasing T (1997) Observations of a transverse nonlinear magnetooptical effect in thin magnetic garnet films. Phys. Rev. Lett.78: 2004-9

Popp FA, Nagl W, Li KH (1984) Biophoton emission- new evidence for coherence and DNA as source. Cell Biophysics 6: 33-51

Reif J, Zink JC, Schneider CM, Kirschner J. Effects of surface magnetism on optical second harmonic generation. Phys. Rev. Lett. 67: 2878-2883

Rein G (1992) Storage of non-Hertzian frequency information in water. Proc. Internat. Tesla Soc., Colorado Springs, CO.

Rein G (1997) Geometric resonances of DNA: the geometric continuum model. Proc. Internat. Forum on New Science, Denver, CO.

Roweis S, Winfree E, Burgoyne R, et al. (1998) A sticker based model for DNA computation. J. Computational Bio. 5: 615-629

Sponer J, Leszczynski J, Hobza P (1996) Hydrogen bonding and stacking of DNA bases: a review of quantum chemical ab initio studies. J Biomol Struct Dyn 14: 117-135

Zozulya AA, Saffman M, Anderson (1994) DZ Propagation of light beams in photorefractive media: Fanning, self-bending, and formation of self-pumped four-wave-mixing phase conjugation geometries. Phys Rev Lett. 73: 818-821.