

# Different Types of Nanotechnology Devices

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Nanotechnology is a new technology that is based upon **recognized scientific principles** and material science **fabrication techniques** where individual molecules and even atoms can be arranged into precise structures.

“Nano means one billionth. Nanotechnology is the study and design of systems at the nanometer scale - the scale of atoms and molecules.” (Exploring the Nano World. <http://mrsec.wisc.edu/Edetc/index.html>). Nanoscale technologies are the development and use of devices that have a size of only a few nanometers.

## LifeWave Overview

The goal of LifeWave technology is to create a variety of patches using proprietary solutions of organic molecules as building blocks. The LifeWave Energy and Stamina Patches are comprised of solutions of optically active organic materials.

These special solutions are placed in a reservoir between two pieces of plastic, which create a sealed chamber. Within the sealed reservoir is a piece of **fabric that serves as a template** for the **self assembly** of organic **molecular antennas** (nano-sized molecular structures) using **solution-based self-assembly processes**.

**Photoelectric dendrimeric branching light-harvesting molecular antennas have been designed and synthesized by a number of researchers.** (Z. Xu, J.S. Moore, "Design and Synthesis of a Convergent and Directional Molecular Antenna," Acta Polymerica 45(1994):83-87.; M.R. Shortreed, S.F. Swallen, Z.-Y. Shi, W. Tan, Z. Xu, C. Devadoss, J.S. Moore, R. Kopelman, "Directed Energy Transfer Funnels in Dendrimeric Antenna Supermolecules," J. Phys. Chem. 101(1997):6318-6322.; C. Devadoss, J.S. Moore, "Synthetic Light Harvesting Antennas," 1999 McGraw-Hill Yearbook of Science and Technology, McGraw-Hill, NY, 1999, pp. 284-287.)

## Photoelectric and Photovoltaic Devices

By way of example, solar cells have been around for decades however one of the draw backs is that they don't work well on cloudy days, because the older technology is based on harnessing the energy of visible light. Now new technology based on plastic composite materials is being researched that can create solar cells that are able to harness the sun's invisible, **infrared rays**. National Geographic reported in January of 2005 that scientists had combined nano particles called quantum dots with a polymer to make a plastic composite that can be sprayed onto other materials and used as portable electricity (Stefan Lovgren. [Spray-On Solar-Power Cells Are True Breakthrough](#). National Geographic, January 14, 2005.)

The point of discussing the nanotechnology aspect of this plastic paint is that the plastic composite containing the quantum dots actually absorb the sun's infrared energy and convert it to electricity.

### **Other Examples of Using a Molecular Antenna to Harness Electromagnetic Energy**

Dr. Alvin Marks is a scientist who has invented a solar cell on a plastic roll. "In 1994 Advanced Research Development, Inc. (ARDI) of Athol, MA and DOE's Argonne National Lab entered into a cost-sharing cooperative arrangement for the further development of the Lumeloid (t.m. reg.) product. This light-to-electric concept is based on replication of part of the photosynthesis process. The solar panel uses **molecular diodes** called "diads." The Lumeloid process includes the diads in a stretch-oriented electrically conductive polarized film. **The polarizing molecules act as antennae to convert light photons to electric power.** Efficiencies as high as 72% appear possible. The polarizing molecules act as antennas to convert light photons to electric power. Efficiencies as high as 72% appear possible (NEW ENERGY NEWS <http://www.padrak.com/ine/INE9.html>. Monthly Newsletter for the Institute for New Energy. VOLUME 3, NUMBER 5. ISSN 1075-0045, OCTOBER 1995).

Other type of solar cells can be made that uses photosensitive dyes or even organic pigments extracted from raspberries. These devices can be manufactured in a high school chemistry lab and **utilize nano materials.** These devices demonstrate that some nanotech products can be manufactured by relatively simple techniques.

A solar (photovoltaic) cell experimental educational kit has been developed using natural dyes extracted from berries. These photovoltaic kits use **nanocrystalline dye-sensitized solar cells that use an organic dye to absorb incoming light** to produce excited electrons (Nanocrystalline Dye-Sensitized Solar Cell Kit <http://www.solideas.com/solrcell/cellkit.html>).

Here is an example of a device that uses nano-size crystals of titanium dioxide and organic materials. This device is sold as an educational science kit. This simple solar cell kit has been released by the American Chemical Society's [Institute for Chemical Education](#) to teach high school students about nanotechnology. Below is a description of the device that uses **fruit juice as one component used to create molecular antennas.**

"To fabricate the new cell, a titanium dioxide film that is coated on a conductive glass plate is dipped into a solution of a dye (for example **blackberry, raspberry, or pomegranate juice**). A single layer of dye molecules **self assembles** on each titanium dioxide particle and absorbs sunlight. To complete the device, a drop of liquid electrolyte containing iodide (similar to medicinal iodide) is placed on the film to enter the pores of the film. A counter electrode, made of conductive glass that has been coated with a catalytic layer, is then placed on top, and the two glass plates are clipped together using binder clips (1. Greg Smestad. New Solar Cell Kit Links PV, Plants and the Planet <http://www.solideas.com/solrcell/news97.html>); 2. Greg P. Smestad and Michael Grätzel, Demonstrating Electron Transfer and Nanotechnology: A Natural Dye-Sensitized

Nanocrystalline Energy Converter. Journal of Chemical Education, Vol. 75, pp 752-756, June 1998.)

A number of review articles are included that elaborate more on **dye sensitized solar cells** and other optoelectronic applications based on **nanocrystalline films**.

### Reviews

- K. Kalyanasundaram and M. Graetzel. Applications of Functionalized Transition Metal Complexes in Photonic and Optoelectronic devices. Coord. Chem. Rev., 77, 347-414 (1998).
- T. Gerfin, M. Graetzel and L. Walder. Molecular and Supramolecular Surface Modification of Nanocrystalline TiO<sub>2</sub> films: Charge-Separating and Charge-Injecting Devices. Progr. Inorg. Chem., 44, 345-393 (1997).
- A. Hagfeldt and M. Graetzel. Light induced redox reactions in nanocrystalline systems. Chem.Rev., 95, 49-68 (1995).

It is well recognized that the sun emits infrared radiation, however so do animals and the human body. It is called 'body heat'. The concept of molecular antennas is based on the principle of using molecules to act as receivers or transmitters of high frequency electromagnetic energy.

LifeWave patches are manufactured with natural materials **to produce organic molecules that are nanometers in size**. **The production of small molecular antennas of nanoscale size is the nanotechnology aspect of this technology**. The fact that the production of LifeWave patches involves making a solution, using proprietary processing techniques and using a special piece of fabric to cause a precipitation out of solution of **nano-sized molecular crystals** does not in anyway detract from the fact that this is a nanotechnology manufacturing technique.

LifeWave patches are constructed of organic materials. These organic materials have been chosen because they have optical (chiral), liquid crystal and semiconductor properties. By using a nanotechnology production process called **solution-based self-assembly** these optically active and electrically conductive materials when placed in LifeWave patches form small nanosize molecular structures that function as **molecular antennas**. Placing a conducting material in an oscillating magnetic field creates an electrical signal/frequency in the conducting material.

The "very small" molecules in the patches contain electromagnetic properties. These small nanoscale structures serve as passive molecular antennas that are activated by the oscillating electromagnetic field of the body to generate electromagnetic signals that are resonant frequencies for certain structures contained within mammalian cells. These frequencies are generated by the physics principle of INDUCTION.

Next **every element has a resonant frequency** at which it will emit and absorb energy. When you combine various combinations of elements together into molecules you will find that every molecule and every material has its own resonant frequency. You can

determine the molecular structure, molecular weight and size of various organic molecules such as enzymes in protein data bases on the World Wide Web and from this information use standard physics formulas to calculate the **resonant frequency** of a molecule.

“Any object has a certain natural or resonant frequency... when two objects have similar natural frequencies, they can interact without touching, their vibrations can become coupled or entrained.” (Oschman, James L. *Energy Medicine: The Scientific Basis*. London: Harcourt Publishers, 2000.)

The mathematical formula for an antenna (length in meters or in this case nanometers) is well known. If you already know the frequency that you want to create the wavelength in meters or nanometers can be calculated. The proprietary process involved in manufacturing LifeWave patches involves the creation of nanometer sized molecular crystals in a nontransdermal patch. When the molecular crystals in the patches are exposed to the body's oscillating electromagnetic field signals are generated that are resonant with certain protein structures in membrane receptors. These structures are known to operate by a communication system called signal induction (usually a chemical signal, but it can also be a frequency signal) the activation of these receptors results in coupling and amplification of the signal in a process known as signal transduction.

THE BASIC ISSUE IS THAT YOU CAN ACTIVATE METABOLIC REACTIONS WITH FREQUENCY SIGNALS AS WELL AS CHEMICAL SIGNALS, IF YOU HAVE THE PROPER FREQUENCY CODE AND WAVEFORM. LifeWave patches basic function is to generate a set of biologically active signals when the patches interact with the human body.

### **Some Electronic Properties of Biological Molecules**

Enzymes and proteins are also semiconductors. Since enzymes and proteins in the cells organize into cooperative structures and contain components that are nanometer-sized, the length of wavelengths of energy these components will resonate to must also be nanometer in size.

By definition a semiconductor is a solid crystalline substance, such as germanium or silicon or liquid crystalline substances, such as proteins, RNA or DNA that have electrical conductivity greater than insulators, but less than good conductors. Solid crystalline semiconductors are used especially as a base material for computer chips and other electronic devices. Whereas liquid crystal semiconductors like proteins and DNA are being investigated for use in organic electronic devices.

It has been known since the time of Georges Lakhovsky, a Russian electrical engineer that even **cells are electrical in nature**. In his book called *The Secret of Life* published in 1935 he described how cells manifest the electrical properties of resistance, capacitance, and inductance. In his book he described how he could generate high frequency radio waves with an electronic device called a multiwave oscillator. He reported that he could

energize malfunctioning cells, which had lower than normal stored electrical charges by exposing the body to electromagnetic energy. His device produced a temporary increase of charge in the cell membranes in cells with low charge. (This is analogous to recharging a flashlight that uses a charged capacitor. A flashlight with a charged capacitor works better than a flashlight which has a discharged capacitor.) When dysfunctional cells are energized, waste is expelled and nutrients will be ingested. Comparing Lakhovsky invention to LifeWave we find that both methods increase the energy of cells, however there are some differences. While Lakhovsky used an electrical device to send energy into the cells to give cells a temporary charge LifeWave patches send information signals into the cells that cause the cells to produce more energy producing a more sustained effect.

**Capacitance** is an electrical property, which is the ability to accumulate and store charge from a circuit and later give it back to the circuit.

### Chiral or Optical Isomers

"Some chemical compounds have optical activity in the sense that these compounds have the ability to rotate the plane of polarized light. Polarized light has light waves all traveling parallel to each other. Ordinary light has light waves traveling in all directions. When polarized light is passed through **a solution of an optically active compound**, the plane of polarization is rotated to the right or the left. The angle of rotation can be measured in a polarimeter (<http://www.elmhurst.edu/~chm/vchembook/209optical.html>)."

### Faraday's Law of Induction

"In physics, a quantitative relationship between a changing magnetic field and the electric field created by the change, developed on the basis of experimental observations made in 1831 by the English scientist Michael Faraday. The phenomenon called electromagnetic induction was first noticed and investigated by Faraday; the law of induction is its quantitative expression. Faraday discovered that, whenever the magnetic field about an electromagnet was made to grow and collapse by closing and opening the electric circuit of which it was a part, an electric current could be detected in a separate conductor nearby. **Moving a permanent magnet into and out of a coil of wire also induced a current in the wire while the magnet was in motion.** Moving a conductor near a stationary permanent magnet caused a current to flow in the wire, too, as long as it was moving (ENCYCLOPEDIA BRITANNICA)." The phenomenon of induction is used in LifeWave by putting the conducting materials in the patches in the body's moving (oscillating) magnetic field.

### Summary Statement

LifeWave **non-transdermal** patches are constructed from organic materials like amino acids, sugars and stabilized oxygen (all GRAS listed), that are sealed inside a polymer shell (the Hardware). The materials in the patches form molecule sized liquid crystal

structures that are very small antennas. These molecular antennas are activated by the body's energy field to create specific signals that are carried into the body and cause the cells to increase energy production from fat. In a sense patches are programmed like computer chips (the Software) by using different formulas that will produce different sized antennas and different biological messages.

The Patches are completely non-transdermal, no substance enters the body. This has been proven by independent laboratory verification with electron micrographs and studies where the patches were heated to 40 degrees C and placed in a vacuum. These studies have shown that the materials inside the patches do not leave the patches.