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Nano-Electronic Applications in the Nanomedicine Fields

Saher Mahmood Jawd[1]*, Zainab H Al-zubaidy[2] and Alaa Hamza Jaber Al-jelehawy[3]

[1]*Biology Department, College of Education for Gils, Iraq*

[2]*Department of Medical Laboratories Technique, Hilla University College, Iraq*

[3]*Department of Medical Laboratories Techniques, Altoosi University College, Iraq*

ABSTRACT

Nano-electronics is an important application used in the applications of nano-technological devices, especially transistors. Although the term nanotechnology refers to the use of technology less than 100 nanometers in size, nano-electronics often refers to extremely small transistors, and thus the interactions within the atom and quantum mechanical properties are in need of more in-depth and intensive study. As a result, current transistors do not fall within the scope of this classification, even though these devices were manufactured using 45 nm and 32 nm technology. Nano-electronics is sometimes a controversial technology because the current candidates differ significantly from conventional transistors. Some of the new candidates include Molecular Generator/Semiconductor Electronics, One-Dimensional Molecular Nanotubes/Nanowires as well as Advanced Molecular Electronics. Although all of these things carry a glimmer of hope for the future, they are still in the process of development and will not be used in the manufacture of anything soon.

KEYWORDS: Nano electronic; Nano device; Nano delivery; Drug carrier

INTRODUCTION

Nano electronics holds the promise of making computer-electronic processors better than what is available through the use of traditional semiconductor fabrication techniques. Several approaches are being explored today, including new forms of nanolithography, as well as the use of nanomaterials, such as nanowires or small molecules, to replace CMOS components. The field transistors or transistors are also made using both semiconducting carbon nanotubes and hetero structured semiconductor nanowires [1]. Carbon nanotubes have been applied in electro nanomechanical systems, including mechanical memory elements (nano-random-access memory, developed by Nantero Inc.) as well as electric nanomotors (see Nanodriver). In 2005, Nanomix brought to market a hydrogen sensor that embeds nanotubes on a silicon substrate. Since then, Nanomix has obtained patents for many applications of the sensor, for example in the field of exploration for carbon dioxide, nitrous oxide, glucose, DNA...etc.

As a result of research at the University of California, Riverside showed that carbon nanotubes constitute a scaffold suitable for osteoblast proliferation and bone formation as well. With the help of Equus of Franklin, Massachusetts, and Unidem of Silicon Valley, thin films of transparent and electrically conductive carbon nanotubes can be developed to replace indium tin oxide. These thin carbon nanotube films are stronger and mechanically more durable than indium tin oxide films, making them ideal for use in high-resolution, rigid touch screens and flexible displays. Water-based and printable carbon nanotube inks are also preferred in the production of such thin films to replace indium tin oxide. This makes thin nanotube films promising for use in the manufacture

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Address for correspondence: Saher Mahmood Jawd, Biology Department, College of Education for Gils, Iraq

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of computer monitors, cell phones, personal digital assistants and automated teller machines [2-5].

A nanoradio, a radio receiver consisting of a single nanotube, was described in 2007. In 2008 it was demonstrated that a sheet of nanotubes has the ability to act as a loudspeaker if alternating current is applied. Noting that sound is not produced by vibrations, but rather by thermoacoustics. As a result of the high strength and durability of carbon nanotubes, research has turned to weaving them with fabrics to create a stab-resistant and bullet-proof fabric. The carbon nanotubes would effectively prevent lead from penetrating the body, even though the lead's kinetic energy could result in bone fracture or internal bleeding [6]. The flywheel made of carbon nanotubes also has the ability to rotate, at sharp high speeds, on a magnetic axis floating in a vacuum, and the energy storage process in density is likely to approach that of conventional fossil fuels.

As a result, energy can be added or Efficient disposal of it in flywheels in the form of electricity, this may offer a way to store electricity, making electrical networks more efficient in their work and making multiple energy resources (such as wind power generators) more useful in meeting different energy requirements. Here, we note that how to achieve this in practice depends largely on the cost of manufacturing the unbreakable block nanotube structures, in addition to their failure rate to work under effort. Ultrashort single-walled carbon nanotubes have also been used as nanocapsules to deliver magnetic resonance agents as a bio-contrast material. It is also possible that nitrogen-doped carbon nanotubes could replace the platinum catalysts used to reduce oxygen in fuel cells [7-10].

A forest of vertically aligned nanotubes might be able to reduce oxygen in an alkaline solution more efficiently than platinum, which has been used in such applications since the 1960s. Here we note that nanotubes enjoy the benefit of not being subjected to carbon monoxide poisoning [11-13].

Nano Electronics in Medical Devices

This is primarily concerned with the process of replacing nanoelectronics in tissues damaged by disease, accidents, or even industrial means. Examples of such tissues are skin, bone, cartilage, blood vessels, and even organs. This method involves providing a scaffold on which cells can be added and the scaffold must provide suitable conditions for the growth of the damaged tissue. Nanofibres have been found to provide good conditions for the growth of such cells, and one of those reasons is that fibrous structures can be found on many tissues that allow cells to firmly attach to the fibers and grow along them as shown. Nanoelectronic polymers are divided into two main categories, namely [14-16] thermoplastic polymers and thermoplastic elastomers, which helps to identify their areas of use.

The latter group of materials includes phenolic resins, polyester and epoxy resins, all of which are widely used in composed materials when reinforced with hard fibres, such as fiberglass and aramid. Because crosslinking helps stabilize the thermal matrix of these materials, their physical properties are very similar to traditional engineering materials, such as steel. Despite this, its density is considerably lower compared to metals; This makes it ideal for use in lightweight structures. In addition, it is less affected by fatigue. Therefore, they are well suited to be used for parts that are essential to maintaining safety and regularly fatigued in service. A lot of research is being done to take advantage of wires and other nanomaterials in the hope of making solar cells that are cheaper and more efficient than those currently available such as conventional planar silicon solar cells. It is believed that the invention of more efficient solar energy will have a great impact on meeting global energy needs.

Research has also been conducted related to the production of energy for "in-bio" machines, called bio-nanogenerators. Therefore, a bio-nanogenerator is a nano-device based on electrochemistry, such as a fuel cell or a galvanic cell, but the extraction of energy from blood glucose in living organisms is often similar to how the body produces energy from food. To achieve this effect, an enzyme is used that has the ability to strip glucose from its electronics, freeing them up for use in electronic devices. The average human body can theoretically produce 100 watts of electricity (about 2,000 calories from food per day) through the use of a bio-nanogenerator. But even so, that amount is considered true only if all the food is converted into electricity, and the human body needs some energy steadily [17-20], so the energy that is produced is likely to be much less. And that energy, which is produced through such a device, power devices inside the body (including the pacemaker), or nanorobots that rely on sugar to feed them.

Thermoelectronic Nano polymers

Thermo-electronic nano polymers have a relatively low modulus of tensile strength, but have a low density and few properties, such as transparency, that make them well suited in consumer and medical products. They include polyethylene, polypropylene, nylon, acetal resin, polycarbonate and polyethylene terephthalate, all of which are widely used materials. Flexible unit are polymers that have low modulus and show reverse expansion when stretched and are a good material for use in absorbing vibration and fading. They can be classified as thermoplastics (in this case, thermoplastic elastomers) or cross-linked, as in conventional rubber products, such as tyres. Typical rubbers commonly used include natural rubber, nitrile rubber, polychloroprene, polybutadiene, butadiene styrene, and fluorinated rubber, such as Viton [21-23].

Nano-electronic Communication Devices

Optical or optoelectronic devices are replacing traditional analogue electronic devices in modern communication technology due to their increasing bandwidth, power and efficiency, respectively. Photonic crystals and quantum dots are promising examples in the field. Photonic crystals are materials with a periodic difference in the refractive index with a fixed lattice that is half the wavelength of the light used. This makes it possible to provide an optional bandgap width for specific wavelength propagation, so it is similar to semiconductors, but in the field of light or photons rather than electronics.

While quantum dots are nanoparticles that can be used among many other things to produce lasers. The advantage of using a quantum dot laser over a conventional semiconductor laser is that the emitted wavelength depends on the diameter of the dot. Also, lasers produced by quantum dots are cheaper and provide better and higher radiation quality than conventional laser diodes. Lighter, stronger materials will be a huge benefit in aircraft manufacturing, increasing performance. Aerospace vehicles will also benefit from these materials, where weight is a vital factor.

Nano technology will also help reduce the size of the stomach and thus reduce the fuel consumption required to fly it in the air. The use of nanomaterials technology may reduce the weight of the aircraft without an engine by almost half, while increasing its strength and durability [24-26]. In addition, nanotechnology reduces the mass of supercapacitors, which will increasingly be used to power auxiliary electric motors in order to take off the plane without an engine from flat ground to fly in high skies [27-31].

The scientists also created a large number of nanowire assemblies with controlling for length, diameter, doping and surface structure using vapor phase and solution strategies. These oriented single crystals are used in nanowire semiconductor devices such as diodes, transistors, logic circuits, lasers and sensors. Since the nanowires have a one-dimensional structure that implies a large surface-to-volume ratio, the diffusion resistance is reduced. In addition, its electron transfer efficiency, which is due to the quantum confinement effect, makes its electrical properties affected by slight disturbance [32-36].

Therefore, the use of these nanowires in nano-sensor elements increases the sensitivity in the electrode response. As mentioned above, the one-dimensionality and chemical flexibility of semiconductor wires make them applicable in nanoscale [37-40]. Baidong Yang and colleagues conducted some research on room temperature ultraviolet nanowire nanowires in which important properties of these nanowaves were mentioned. They conclude that the use of short wavelength nanolasers has applications in various fields such as optical computing information storage, and microanalysis (Figure 1 & 2).

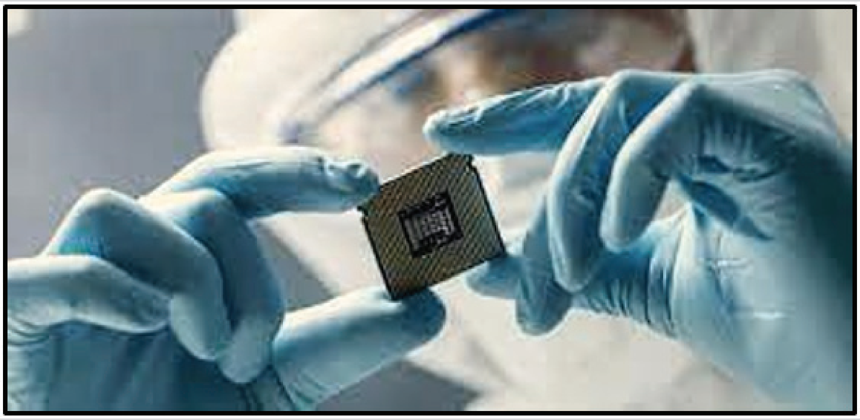

Figure 1: Electronic nanopolymers in recorder device.

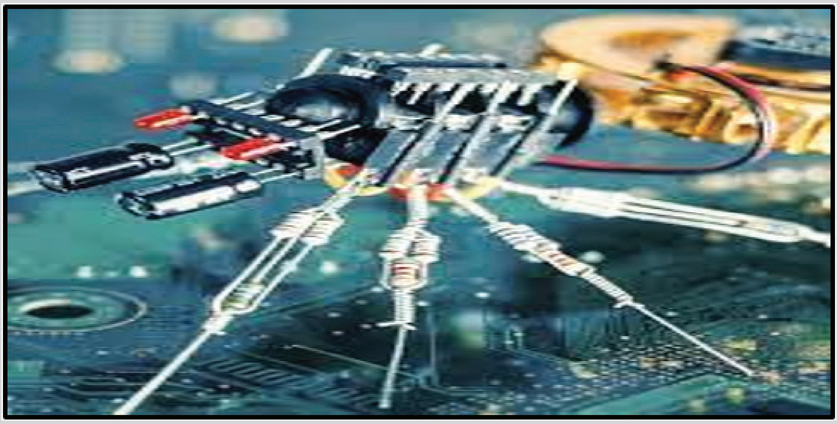

Figure 2: Electronic nanopolymers in Conducting Device.

CONCLUSION

Much of the research on bio-nano generators is still in the experimental stage, and Panasonic's Nanotechnology Research Laboratory is among those at the forefront of this field. There has been a broad interest in the manufacture of nano electronic devices that aim to detect concentrations of biomolecules in real time for use in medical diagnostics, which falls under the category of nanomedicine. A parallel line of research also aims to manufacture individual cell-interacting nano electronic devices for basic biological research. These devices are called nano sensors. Such miniaturization and nano electronics scrutiny towards protein sensing *in vivo* has the potential to enable new inputs into health control, monitoring and defense technology.

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