Available online at www.elixirpublishers.com (Elixir International Journal)

Nanosensors

Elixir Nanosensors 50 (2012) 10501-10503

ISSN: 2229-712X

An application of Nano-electronics in the future communication devices

Shanmugapriyan Ragul.M and Poonguzhali. S
ECE Department, Rgcet, Puducherry.

ARTICLE INFO

Article history:
Received: 1 August 2012;
Received in revised form:
31 August 2012;
Accepted: 19 September 2012;

Keywords
Nanoscale transistors,
Sensing, Stretchable,
Transparent electronics.

ABSTRACT

In this paper, we present the concept demonstrating some of the possibilities of nanotechnologies might enable in the future communication devices. Nanotechnology aloows control of physical problem of nanostructures and devices with single molecule precision. The device is build by numerous nano-transistors. This device is used for sensing toxicity of the materials. The devices constructed by nanotechnology can be stretched and folded to desired length since it has the strength of spider silk. As the transistors are temperature dependent, the devices are auto-chargeable when exposed to sunlight (solar energy). Nanoscale electronics are invisible to human eye, the devices are transparent.

Introduction

Nanotechnology plays a vital role in the electronics field and also in the communication fields. The nanotechnologies which might possibly enable the future communication devices. The devices given with a Bluetooth, which can be used for the hand free communication purposes. The device can help us in everyday life such as sensing the toxicity of the materials, charge by itself when exposed to the sunlight. The devices are constructed by numerous number of nano-transistors, as the transistors parameters are temperature dependent, the devices are auto-chargeable. The surface of the devices are super hydrophobic, so this property makes it extremely dirt repellant. The surface form of the devices context dependent. The nanoscale structure of the device enable stretching. The nanoscale measure fibres which has the strength of spider silk controls the stretching when the device is folded. As the nanoscale electronics becomes invisible to human eye the devices have transparent efficiency. Since the device has the property of transparent efficiency, the buttons on the device surface are real 3D forms. This paper briefly explains about communication device made up of nanotechnology and the comparison with the present day communication devices.

Device Overall Structure Design

The device is built by numerous number of transistors. Consider 10000 transistors being fitted on a single fly hair. Nanograss, Nanosensors, Nanoflowers, Nanoscale mesh, Nanotubes etc are nanotechnologies used inside the device. This transistors are the nanoscale grass of the devices which is useful for the sensing and the charging of the device.

Fig. 1. Nano Flower

Tele:
E-mail addresses: msprahul@gmail.com

Elegant three-dimensional MoS_2 nanoflowers were uniformly formed via heating MoO_2 thin film in a vapour sulphur atmosphere. Tens to hundreds of petals were self-assembled within a single nanoflower. Each petal, 100-300 nm wide and only several nanometers thick, exhibited a hexagonal structure. The number of petal layers gradually decreased towards the edges, resulting in uniquely thin edges, typically less than 3 nm. The MoS_2 nanoflowers appeared to be excellent field emitters displaying a current density of 0.01 and 10 mA/cm^2 at macroscopic fields of 4.5-5.5 and 7.6-8.6 V/mm, respectively; the electron field emission was consistent with the Fowler-Nordheim theory.

The integrated electronics could cost less and include more functionality in much smaller space, even as interfaces are simplified and usability is enhanced. All of these new capabilities will unleash new applications and services that will allow us to communicate and interact in unprecedented ways. The internal transistor image of the device are given below

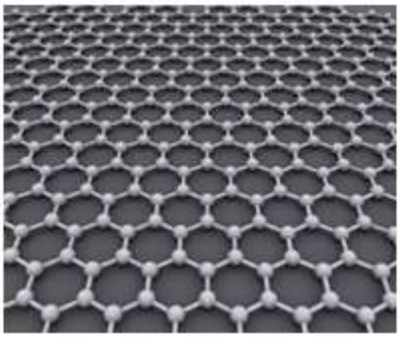


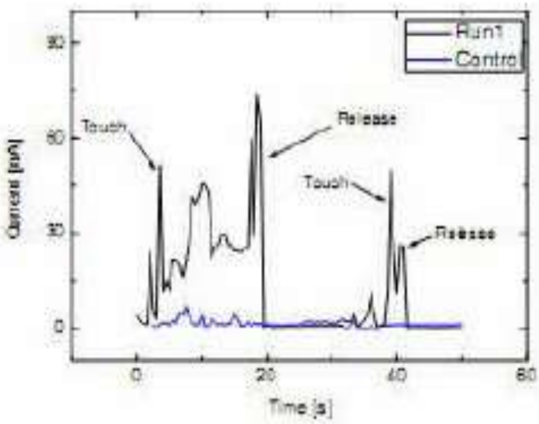
Fig. 2. Nano Transistor

Advancement

This section deals with the advancement of the communication devices by using nanotechnology.

Sensing the Environment

Nanosensors would empower users to examine the environment around them in completely new ways, from analyzing air pollution, to gaining insight into bio-chemical traces and processes. New capabilities might be as complex as helping us monitor evolving conditions in the quality of our surroundings, or as simple as knowing if the fruit we are about to enjoy should be washed before we eat it. Our ability to tune into our environment in these ways can help us make key decisions that guide our daily actions and ultimately can enhance ourhealth



Graph 1. Sensing surface

Device can interact with the surrounding environment and is capable of providing key information for anything from temperature changes to pollution, that is, device can sense its surrounding. Nanosensors are used for this purpose and it empowers users to environment around them in completely new ways, from analyzing air pollution, to gaining insight into bio-chemical traces and processes. New capabilities might be as complex as it may help us monitor evolving conditions in the quality of our surroundings.

Nanostructures can also enable robust chemical and bio-chemical sensing, especially in scenarios where nanoscale values are being measured. And since nanoscale is the scale o fundamental processes of life, nanoscale chemical sensors can leverage principles and materials common to biological systems. Nanosensors construct acomplete awareness of the user context – both personal and environmental enabling an appropriate and intelligent response. In order to improve sensor and signal processing characteristics, introduced Nano-Wire Lithography (NWL) process that fabricates a arge area and self aligned 3D architectures.

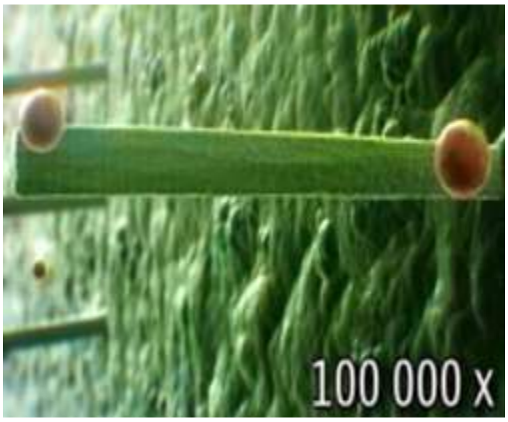


Fig. 3. Active Sensing Nanograss

Self-Cleaning

Nanotechnology also can be leveraged to create self-cleaning surfaces on mobile devices, ultimately reducing corrosion, wear and improving longevity. Nanostructured surfaces, such as “nanoflowers” naturally repel water, dirt and even fingerprints utilizing effects also seen in natural systems.

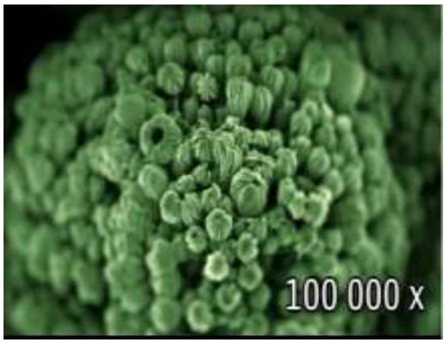


Fig. 4. Closed Nanograss during Self-Cleaning

When any fluid split over the device, the nanograss closes and the fluid will not withstand over the device and flows down.

Flexible and Changing Design

Nanotechnology enable materials and components that are flexible, stretchable, transparent and remarkably strong. Fibril proteins are woven into a three dimensional mesh that reinforces thin elastic structures. Using the same principle behind spider silk, this elasticity enables the device to literally change shapes and configure itself to adapt to the task at hand.

A nanoscale mesh is shown below.

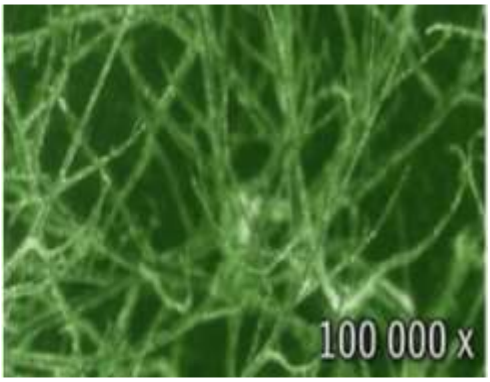


Fig. 5. Nanoscale Mesh

A folded design would fit easily in a pocket and could lend itself ergonomically to being used as a traditional hanset. An unfolded larger design could display more detailed information, and incorporate input devices such as keyboards and touch pads.

Even integrated electronics, from interconnects to sensors, could share these flexible properties. Further, utilization of biodegradable materials might make production and recycling of devices easier and ecologically friendly.

A nanoscale mesh fibres has the strength of spider silk which controls the stretching when the device is folded.

Advances Power Sources

Nanotechnology holds out the possibility that the surface of a device will become a natura source of energy via a covering of “Nanograss” structures that harvest solar poer. AT the same time new high energy density storage materials allow batteries to become smaller and thinner, while also quicker to recharge and able to endure more charging cycles.

Future scope

* Shape could be made much simpler like a ring or circular shape.

* If the device built with aritifical intelligence, it can be used to control other electronic devices too.

* Nanoscale batteries developed by using nanoparticles such as magnesium and silicon will help us to overcome the drawback of stretchable batteries.

* If the nanotreansistors are constructed by using silicon material, then the cost of the device can be brought down.

* If the devices can be further stretchable, then it can be used as personal computer's keyboard also.
* Instability of solvent leakage and evaporation overcome means, this device can have a go in global market.

Applications

Nanotechnology enables the use of materials that are both flexible and strong. Fibril proteins are woven into a three dimensional mesh that reinforces thin elastic structures, making these devices highly adaptable. Another advantage of nanotechnology is the self-cleaning attribute of such devices, which reduces corrosion, wear and improves longevity. Also, by using a cover of "Nanograss" structures that harvest solar power, the device's surface becomes a natural source of energy. Batteries improve and become smaller, longer lasting, and faster to charge (high energy density storage materials). Even integrated electronics, from interconnects to sensors, and could share these flexible properties. Further, utilization of biodegradable materials might make production and recycling of devices easier and ecologically friendly.

Conclusion

According to this paper, the device discussed is adjustable, empovering devices, bringing us new versatile possibilities. These devices will be flexible, stretchable and shape changing, so that they can be easily integrated in our everyday routines without special adjustments on our part. Nanosensors would raise the awareness of devices users to the environment in a new way. When air pollution of bio-chemical traces and process are right before our eyes, we will not able to ignore them. The above future scope will change the device in order to make it cost effective, durable, and also a wearable device.

References

1.Suresh Kumar Lalchandani, "Nokia Morph Technology", Seminar Report,2009-2010.
2. Tombing, "A Nanotechnology Concept Device", 2008.
3. G. E. Moore, IEEE IEDM Tech, "Nano-Transistors", 1975.
4. International Technology Roadmap for Semiconductors, published by the Semiconductor Industry Association, San Jose, CA, 1999.
5. G. Timp, et al. IEDM Tech, Dig. (1998)615 and G. Timp et al. IEDM Tech., "Nano-Transistors", 1999.
6. D. Muller et al., Nature, "Nanotechnology", 1999.
7. S. Datta, F. Assad, M.S. Lundstrum, Superlattices and Microstrucutres, 23, 1998, p771.
8. Manav Sharma, "Introduction to Nanotechnology", 2009.

Books:

*Introduction to Nanotechnology, Charles P. Poole and F. Jowens.
*Nanoscale Science and Technology, Robert Kelsall, Ian Hamley and Mark Geoghegan.
*Nanotechnology: Science, Innovation and Opportunity, Lynn E. Foster
*Nanoelectronics and Information Technology, Rainer Waser.