Nanotechnology based on Flexible Electronics

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Abstract:- **Nanotechnologies promise to be foundation of industrial revolution. Most of the electronics industry is dependent on the ever-decreasing size of lithographic transistor. It seems to be promising successor to lithographic based ICs. American Society of Mechanical Engineers said that nanotechnology will leave virtually no aspect of life untouched is an excepted to be in widespread use by 2020.Nanoelectronics improving display screens on electronics devices. It reducing the size of transistors used in an Integrated system. It is special issue focus on blossoming field of flexible electronics by using nanotechnology. Flexible electronics is a new trend in electronics industry to handle the increasing burden on chips. This is technology which simplifying electronics circuits by electronic devices on flexible plastic substrates. Flexibles materials can be used to make conformal electronics that stuck on fabric, skin, walls and windows. Fabrication cost of manufacturing flexible electronics is cheaper than lithographic fabrication. Stretchable electronics or flexible electronics is likely to future of mobile electronics. Potential applications include wearable electronic devices, biomedical uses, compact portable devices, and robotic devices circuits. Nanomaterials in terms of performance, solution processability and processing temperature requirements, which makes them very attractive for flexible electronics. This technology is being used in number of application due to benefits light weight, favourable dielectric properties and high circuit density.**

INTRODUCTION

Scientists will now understand how simple atom and molecules come together and arrange themselves to form complex system, such as living cells that make life possible on earth. Generally complex systems are built from simple atomic-level constituents which in area of Nano science and Nanotechnology. Nanoscience is concerned with nanomaterials, i.e. materials that are at least one of the dimensions of about 1 to 10 nanometres. The word ‘nano’ comes from Greek word “nanos” meaning dwarf. A billionth of meter 1,00,000 nanometre of human hair. Five atoms of carbon would occupy a space about 1 nanometre wide. Recently, studies on flexible and stretchable electronic devices have demonstrated various electronics applications, such as resistors, diode, and transistors, sensors (e.g., strain, temperature and electrochemical sensor), wireless radio-frequency (RF) communication components (e.g., capacitor, inductor and antenna), and light-emitting elements (organic light-emitting diode) on substrates with various materials. For health monitoring and diseases control mainly because of eliminating the mismatch tissues or organs and electronics. Flexible or stretchable electronics on polymer-based substrates (e.g., Parylene , SU8 , and polyimide), which mismatch between the devices and the organs. Recently, carbon-based nanomaterials such as graphene and carbon nanotubes(CNTs) have been applied in the field of bio-electronic because of their physical structures. The various types of flexible and substrates that are integrated with CNTs and graphene for the construction of high-quality active electrode arrays and sensors. Finally, future works with challenges are presented in bio-integrated electronic applications with these carbon-based materials.

WEARABLE ELECTRONICS

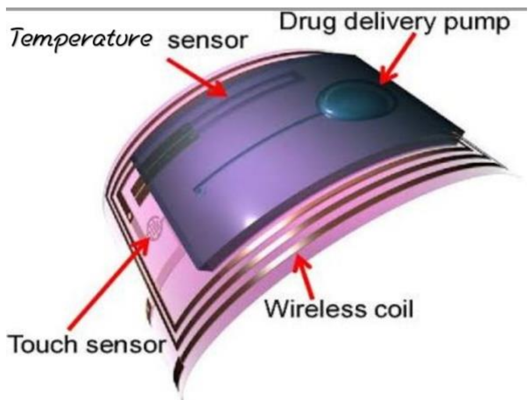
Smart watches, fitness trackers, smart garments, smart medical attachments and data gloves are quickly evolving beyond health care, fitness and wellness. Wearable electronics consists of sensors, actuators, electronics and power supply or generation. They have unique characteristics such as low modulus, light weight, highly flexible and stretchable. It is attached to the surface of skin or organs. Most flexible physical sensors are described temperature, pressure and strain.

WEARABLE ACTUATORS

Actuators react to an electrical signal or stimuli generated from processing unit. Such stimuli can be developed by mechanical, thermal, chemical reactions. The development of e-textiles and smart fabrics has broadened the application of wearable actuators. In flexible and wearable electronics the selection of materials is very important. Based on their application, they should have enough strength, structural rigidity and flexibility. They should provide comfort and biocompatibility specially for drug delivery system and therapeutic system. With this variety of materials and their applications, researchers have followed different fabrication processes as well including electro-spinning, spray coating and solution casting.

WEARABLE SENSORS

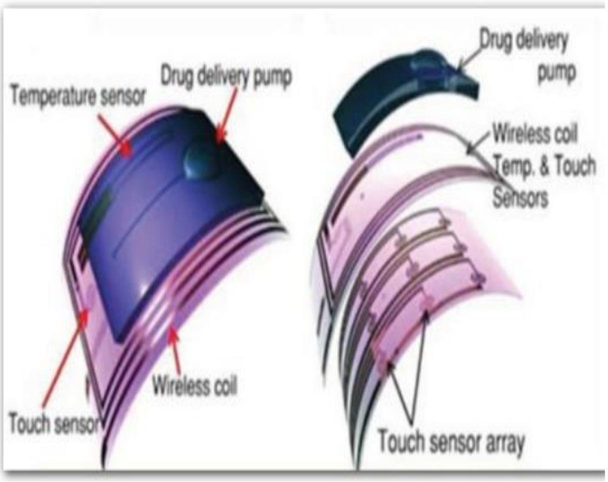
Nano material sensors are senses an external stimulus and convert it into measurable signal. Wearable sensors are used



to do continuous monitoring of human body. Flexible sensors are very important in cardiovascular diseases such as heart pulse, body temperature, respiration rate, oxygen rate, body posture etc. Flexible sensors that mainly track physical activities and vital signs, the new generation of wearable electronics enables real-time, continuous and fast detection of accessible biomarkers from human body. They analysis sweat, tears, saliva, blood, interstitial fluid, wound as well as exhaled breath. Wearable devices equipped with a series of simplified sensors such as temperature, strain sensors for posture, biosensors for disease monitoring and multifunctional sensors. Wearable sensors need to be light weighted and flexible, exhibit superior mechanical and thermal performances to prevent from damaged and should be cost. Design to possess high flexibility, strectchability, sensitivity and wide sensing range. Nanocomposites incorporating with existing nanomaterials: strain sensors; pressure sensors; temperature sensors; and multifunctional sensors. It is embedded in clothes or attracted to parts of body like finger, arm, wrist, leg. Others can be embedded in accessories such as gloves, earrings, watches and brooches.

FUTURE DEVELOPMENTS

In future as manufacturing technology advances,



- It is likely that graphene will become a dominant material in electronics.
- Other materials will struggle to match the combination of electrical conductivity, flexibility and physical strength.
- Research using graphene to build many of the necessary components for flexible electronics.
- Doctors inside your body. It means that monitor our health by strapping gadgets (Implanting or injecting tiny sensors inside our body).
- For body of bicycles, stain resistant clothes and healthcare products reinforced with carbon tubes.
- By nanorobitics is used to produces artificial red blood cell and white blood cells.
- Nothing is get dirt due to development of nanometres (Zero-pollution manufacturing).
- Ultra high-yield agriculture.
- Carbon nano tube based flexible super capacitors as an alternative to batteries.

CONCLUSION

Flexibility is a major breakthrough in the world of electronics, which will enable a new paradigm in design and functionality for the devices which our modern lives depend upon. Flexible devices have already begun to make their way into the commercial realm, and the next few years are bound to see huge changes brought on by this additional dimension which is now available to electronics manufacturers.Flexible-electronics is rapidly finding many main-stream applications where low-cost, ruggedness, light weight, unconventional form factors and ease of manufacturability are just some of the important advantages over their conventional rigid-substrate counterparts. Flexible Electronics: Materials and Applications surveys the materials systems and processes that are used to fabricate devices that can be employed in a wide variety of applications, including flexible flat-panel displays, medical image sensors, photovoltaics, and electronic paper. Nanomaterials are also offer a wider application potential to create connected garments that can sense and respond to external stimuli via electrical, color, or physiological signals.

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