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" GREEN ELECTRONICS"

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ABSTRACT :

An Green electronics developing strategies to manage such e-waste ,further challenges can be identified conserning the conservation and recycling of scares elements,reducing the use of toxic material and solvents in electronic processing ,and lowering energy usage during fabrication method .in response to this issue,the construction of electronic devices from renewable or biodegradable material that decomposes to harmless by- productsis becoming a topic of great interest .such "green" electronic devices need to be fabricated on a large industrial scale through low energy low-cost method that involve low/non-toxic functional material or solvents. recent advances in the development of biodegradable material and green processing strategies of green electronics with on emphasis on areas where green electronic devices including solar cell,organic field effect transistor,light emitting diodes,and other electronic devices

Keywords-Green electronics, solar cell, organic field effect transistor , light emitting diode.

INTRODUCTION :

Electronics developed using environment-friendly material material and process are envisaged as "green electronics".conventional electronics use semiconducrors,metals,and metal oxides that are processed through energy –intensive fabrication steps and are hard to recycle at the end of product life. Green electronics facilitate a transition from conventional to environment friendly electronics using biodegradable and earth abundant materials,replacing hazardous material for the fabrication of these devices.

The innovation of material choises and manufacturing process, such as additive manufacturing or printing technologies, and recycling strategies ,drive academic and industrial research towards green electronics and integrated and balanced assessment of key aspects, like the carbon footprint of the technology ,option for sustainable material.

LITERATURE SURVEY:

Biodegradable electronics
Authors: Sachin Himalayan,vrinda guptha
Abstract: electronic waste is always a big problem when it comes to the disposal of electronic appliances,and they pose a significant threat ecologically.new technology replaces the existing one ,and older one is discarded
.biodegradable electronics ,as an emerging research area
,gives viable solution to the problem of E-Waste.it mainly deals with the development of transient electronic devices , i.e., getting decomposed gradually or dissolvable in an eco-friendly way when their purpose has been achieved.[1]

MXene Nanosheets-decorated paper as a green electronics material for biosensing
Authors:shan-chu yu,Tzu-yen Huang,Tzu-En Abstract:this research delves into the development and optimization of MXene nanosheet-nased paper electrodes,emphasizing their adaptability in green electronics and diverse applications.Xuan paper, a cellulose –based material,was identified as an ideal substrate for its mechanical attributes and capacity to accommodate MXene,further yielding outstanding electrical conductivity. The MXene paper electrode demonstrated consistent performance under various conditions,showing its potential in the field of wearable electronics and medical devices .its impressive
Advance in green electronic technologies Author : albert sabban
Abstract:green manufacturing recycling computing devices,computing modules and electronic components,and cellular phones during the manufacturing of computing networks,laptops,and their peripheral devices.minimizing waste cause environmental pollution because of these activities.it presents new topic and innovations in green computing technologies that can be applied in green computing and electronic industries.major topics in green computing electronics technologies such as renewable energy ,green energy,waste and green computing.in 2023 green computing should be used to protect the world from air and water pollution

Green electronics cellulose based transistor

As a natural dielectric material,paper is used for a substrate or gate dielectric of FETs,and tunnel barriers of electrolytes.the interiors of electronic devices consist of a printed circuit board(PCB) with embedded electronic components.PCBs which consist of a flat sheet of insulating material and layersof copper foil,are used to mechanical support and electrically connect electrical components.Apaper based PCB has been fabricated using conventional paper as shown in fig 1.1demonstrating comparable function to the current available organic-PCB (O-PCBs).Cellulose fibers are also used as a dielectric layer for FETs. FETs consist of the body; the gate dielectric; and three terminals: source (S), gate (G), and drain (D), as shown in Figure b.Electron flow between the drain and the source is controlled by the applied voltage at the gate. The body is typically a bulk semiconductor which supports the other components. The gate dielectric is the layer that separates the gate from the source and the drain. As cellulose fiber complex, or paper, is a great dielectric material, FETs have been demonstrated on diverse paper substrates Paper, in its manufactured form, has various types, including cotton paper, photo paper, fine paper, packing paper, and others.One of the first reports of FETs on paper used opaque paper substrates, as shown in Figure c. In this early work, OTFTs were fabricated on a hot-pressed cottonfiber paper, showing carrier mobility of 0.2 cm2 V−1 s. The carrier mobility was increased to

2.5 cm2 V−1 s, which is one order of magnitude higher than the first report of this method , with fully printed OTFTs on commercially available photo paper. The schematic illustration is

wax-printer is used for micropatterns, followed by vacuum filtration through the wax-printed filter paper of dispersions of CNFs that contain either carbon nanotubes or silver nanowires. In parallel, pure CNF dispersions are filtered through a neat filter paper to

electrothermal capabilities and environmentally conscious decomposition mechanism make it a promising candidate for further green electronic application.the electrodes harmonization of performance and environmental sustainability,paving the way for its integration into futuristic electronic solution.

shown in Figure d. An extremely low-temperature fabrication process was developed for this technology, which enabled creating OTFT on a heatsensitive substrate. Transistors have also been demonstratedwith transparent paper. Huang et al. reported the development of flexible organic FETs with high transparency.Nanopaper based on a cellulose nanofibrillated fiber (CNF) is used in this work, which has both good transparency and thermal stability.

One of the common methods to create a conductive component for paper-based electronics is to deposit component for paper-based electronics is to deposit conductive material. In this case, the surface roughness of the paper substrate is crucial, as the rough surface leads to high resistance. To avoid having numerous air voids in typical paper, polymer-based coatings are often used; however, polymers are easily damaged by heat and their use often results in discoloration issues as well. In 2013, Hsieh et al. reported highly conductive circuits fabricated directly on nanopapersFig 1.2 shows a silver metallo–organic decomposition line on a nanopaper. Hsieh et al. successfully showed that sputtered gold and printed silver nanoparticles maintained log resistance of less than 0.4 Ω−1 . In addition to the high conductivity, retaining electrical conductivity after multiple folding events is important to realize truly foldable flexible electronic circuits. In 2015, Cataldi et al. reported a protocol to create a foldable conductive paper-like material by impregnating a composite of starch-based biopolymer and graphene nanoplatelets into meltblown nonwoven cellulose fiber fleece substrates.[74] This material reported excellent isotropic electrical conductivity, reaching a very low sheet resistance value of 10 Ω sq−1 . This conductive paper-like material was also shown to function even after squashing and severe deformation 1.2 Much previous research in printed electronics has relied on the method of creating a conductive layer by direct printing, sputtering, or spray deposition. However, this method often suffers from the incompatibility between the substrate and theconductive layer, such as the swelling ratio difference. Recently, Hajian et al. developed a process that monolithically integrated electronic structures and cellulose nanopaper by co-dispersing cellulose nanofibers with functional nanomaterials, as shown in Figure 1.2 c First, a

form the nanopaper substrate. The hydrogels on the filter paper are laminated, vacuum pressed, and dried. The nanopaper is finally removed from the filter paper to form a freestanding patterned structure. As a result, the conductive layers are highly resilient to folding as well as hygroexpansion. Composites of cellulose and conducting polymers are another method to achieve electrically conductive papers. Cellulose-PANI composites have recently been widely studied owing to their great electrical conductivity and mechanical properties. Hu et al. have demonstrated an electrically conductive BC-PANI nanocomposite paper by chemically grafting PANI onto BC modified with epoxy[45] (Figure 23d). It was also shown that the electrical conductivity of PANI-BC composite is highly sensitive to the twisted angle of the sheet, implying its great feasibility of using in strain sensors. Indeed, such strain-sensitive characteristics. of cellulose-based conducting materials are widely adopted for human motion sensors and wearable devices,

Figure a.

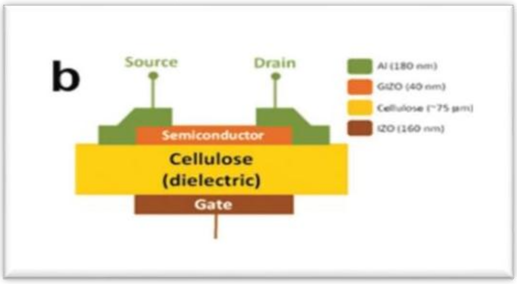

Figure b.

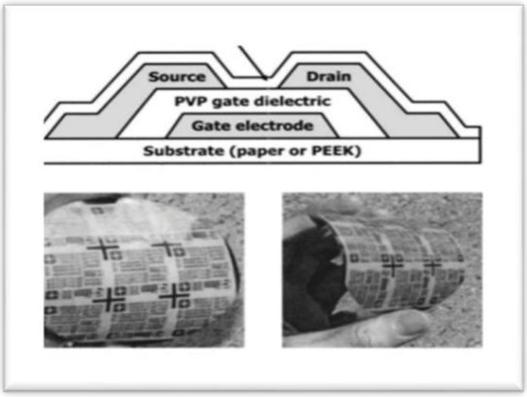

Figure c.

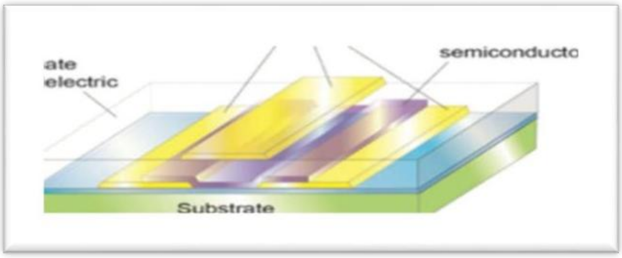

Figure d.

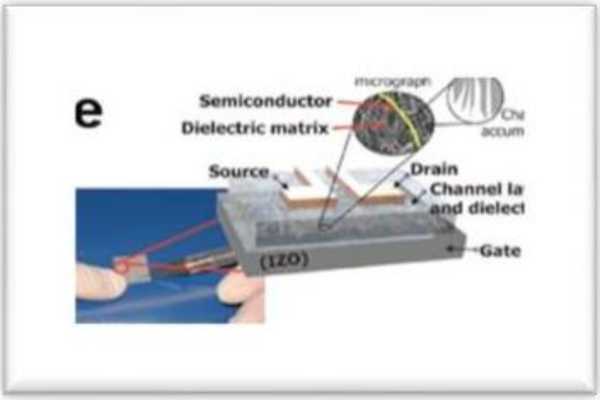

Figure e.

Fig 1.1 Paper electronics and transistors. a) LED array on a three-layer paper-based multilayer PCB. b) Schematic of the FET structure using cellulose as a gate dielectric. c) Schematic cross-section of a pentacene TFTand photograph of integrated circuits on paper. d) A schematic structure of an OTFT e) A structure used for a memory transistor

CONCLUSION

cellulose, as it can be mainly produced from glucose,which is also achieved from agro-industrial wastes.In this regard, silk and BNCs are by far the most green materials ever reported. Conventional inorganic counterparts but possess more interesting properties that even extend the range of applications in the field and improve performance of photonic and electronic devices.

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