PAPER BATTERY

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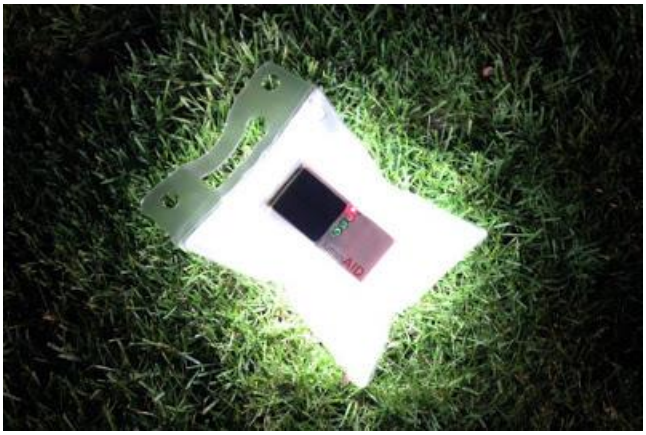
***Abstract*-The paper battery is designed to use a paper-thin sheet of cellulose (which is the major constituent of regular paper, among other things) infused with aligned carbon nanotubes. The nanotubes act as electrodes, allowing the storage devices to conduct electricity. The battery will currently provide a low, steady power output as well as a supercapacitor's quick burst of energy. While a conventional battery contains a number of separate components, the paper battery integrates all of the battery components in a single structure, making it mo re energy efficient andlighter.A paper battery is a flexible, ultra-thin energy storage and production device formed by combining carbon nanotube s with a conventional sheet of cellulose- based paper. A paper battery acts as both a high-energy battery and supercapacitor, combining two components that are separate in traditional electronics. This combination allows the battery to provide both long-term, steady power production and bursts of energy. Non-toxic, flexible paper batteries have the potential to power the next generation of electronics, medical device s and hybrid vehicles, allowing for radical new designs and medical technologies. It is a glimpse into the future of power storage. The team behind the versatile paper, which stores energy like a conventional battery, says it can also double as a capacitor capable of releasing sudden energy bursts for high-power applications.**

INTRODUCTION

A paper battery is an ultra-thin, flexible energy storage device that is used as a battery and also as a good capacitor. It is created by combining two things: nano composite paper and nanotubes (nano composite

paper made from cellulose and nanotubes made from carbon). Nanocomposite paper is a hybrid energy storage device made of cellulose, which combines the features of super capacitors and batteries. It takes the high-energy storage capacity of the battery and high-energy density of the super capacitor producing the bursts of extreme power. This combination allows the battery to provide long-term steady power production. Non-toxic, flexible paper batteries have the potential to power the next generation of electronics, medical devices and hybrid vehicles, allowing for radical new designs and medical technologies.



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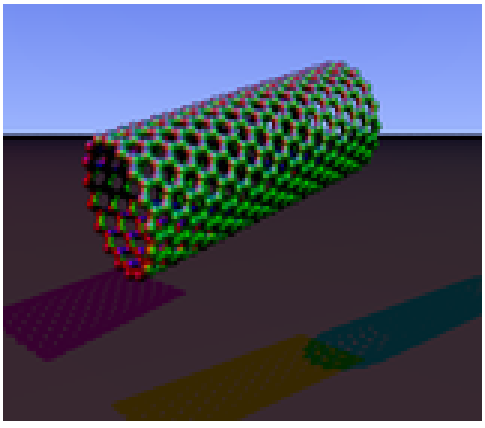

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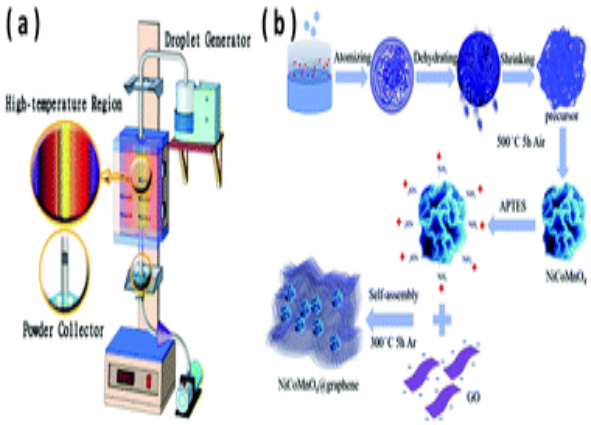
MANUFACTURING OF PAPER BATTERY

One method of manufacturing begins with growing the nano tubes on a silicon substrate and then impregnating the gaps in the matrix with cellulose. Once the matrix has dried, the material can be peeled off of the substrate, exposing one end of the carbon nano tubes to act as an electrode.
When two sheets are combined, with the cellulose sides facing inwards, a super capacitor is formed that can be activated by the addition of the ionic liquid. This liquid acts as an electrolyte and may include salt-laden solutions like human blood, sweat or urine. The high cellulose content (over 90%) and lack of toxic chemicals in paper batteries makes the device both biocompatible and environmentally friendly, especially when compared to the traditional lithium ion battery used in many present electronic devices and laptops.
Specialized paper batteries could act as power sources for any number of devices implanted in humans and animals, including RFID tags, cosmetics, drug-delivery systems and pacemakers. A capacitor introduced into an organism could be implanted fully dry and then be gradually exposed to bodily fluids over time to generate voltage. Paper batteries are also biodegradable, a need only partially addressed by current re-cycling and other electronics disposal methods increasingly advocated for by the green computing movement.

WORKING OF PAPER BATTERY

A conventional battery or Rechargeable battery contains number of separate components that produce electrons through a chemical reaction between the metal and the electrolyte of the battery. The Paper battery works when the paper is dipped in the ion-based liquid solution; next a chemical reaction occurs between the electrodes and liquid. The electrons move from the cathode to anode to generate electricity. The paper electrode stores energy while recharging within 10 seconds because the ions flow through the thin electrode quickly. Figure 4.1 shows the working of a paper battery. The best method to increase the output of the battery is to stack different paper batteries one over the other



CONCLUSION

One of the major problems bugging the world now is Energy crisis. Every nation needs energy and everyone needs power. And this problem which disturbs the developed countries perturbs the developing countries like India to a much greater extent. Standing at a point in the present where there can't be a day without power, Paper Batteries can provide an altogether path-breaking solution to the same. Being Biodegradable, Light-weight and Nontoxic, flexible paper batteries have potential adaptability to power the next generation of electronics, medical devices and hybrid vehicles, allowing for radical new designs and medical technologies.

The battery is self-rechargeable when exposed to relative humidity above 40%. This constitutes the first step towards future fully integrated self- sustained flexible, cheap and disposable electronic devices, with great emphasis on the so-called paper electronics. The intrinsic properties of paper, such as high solvent absorption and strong binding with nanomaterials, allow easy and scalable coating procedures. Taking advantage of the mature paper technology, low cost, light and high-performance energy-storage devices are realized by using conductive paper as current collectors and electrodes. The concept of using paper as a novel substrate together with solution-processed nanoscale materials could bring in new opportunities for advanced applications in energy storage and conversion. By combining our paper-based energy storage with other types of devices developed, such as bioassays or displays on paper, full paper electronics could be realized in the future.

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