



**ALLU ANUSHA
PRESENTATION**

CONTENT

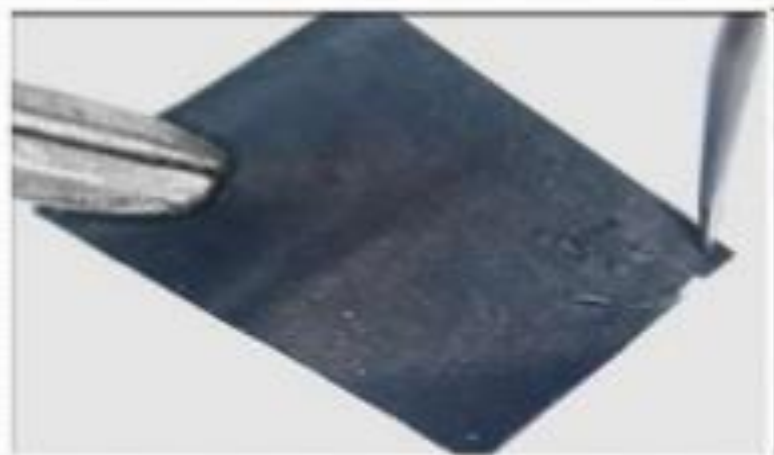
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INTRODUCTION

- A paper battery acts as both a high energy battery and super capacitor, combining two components that are separate in traditional electronics.
- This technology can be greatly utilized by medical devices.



WHAT IS A PAPER BATTERY?



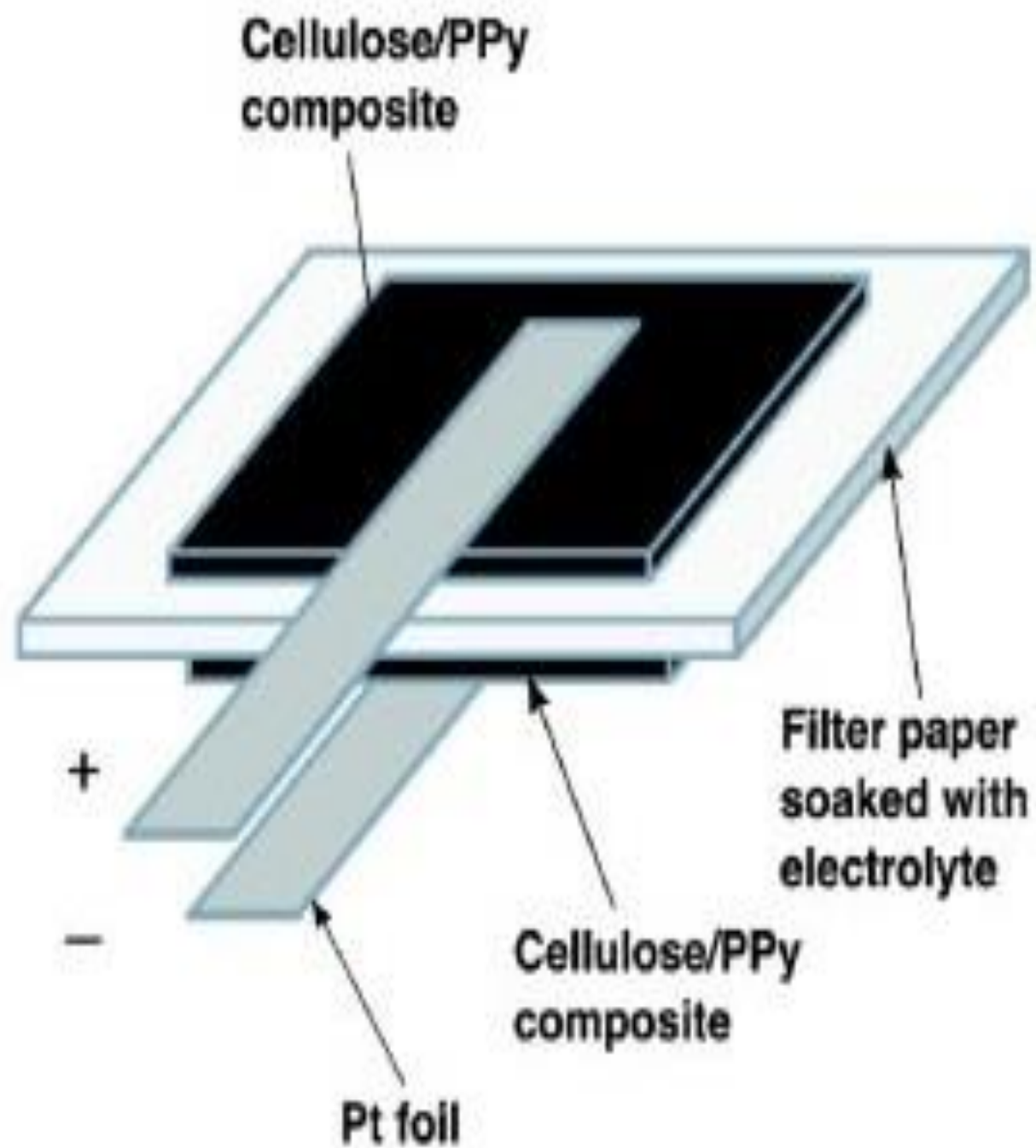
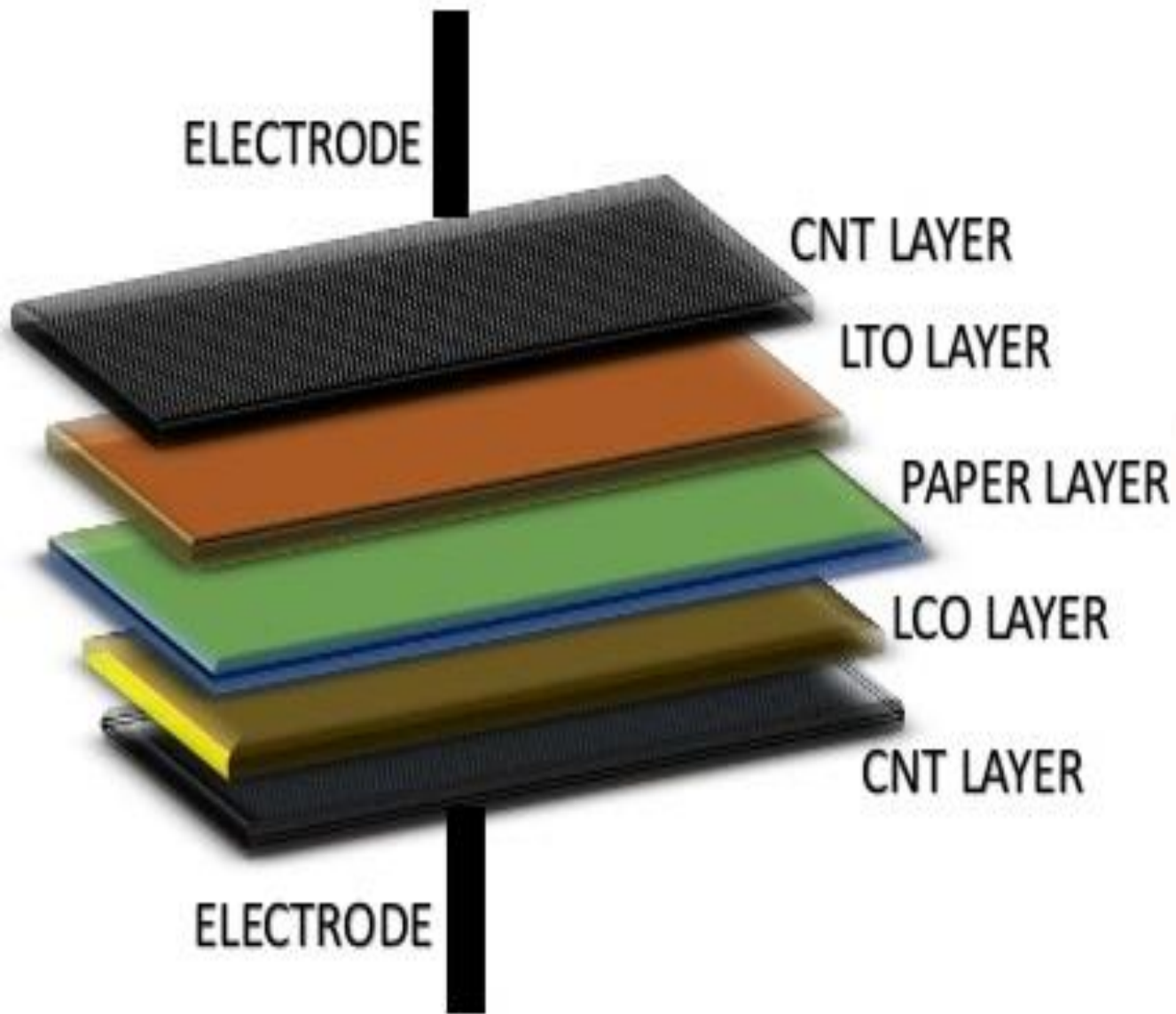
- A paper battery is a flexible, ultra-thin energy storage and production device formed by combining carbon nanotube with a conventional sheet of cellulose-based paper.
- A paper battery acts as both a high-energy battery and super-capacitor, combining two components that are separate in traditional electronics.

CONSTRUCTION

- Actually, there are many ways to construct paper batteries. Given below are three ways to create paper batteries:
- The first method involves fabricating zinc and manganese dioxide based cathode and anode. The batteries are printed onto paper using standard silkscreen printing press.
- This paper is infused with aligned carbon nanotubes which are used as electrode. This paper is dipped in a solution of ionic liquid which acts as the electrolyte.



Structure



WORKING OF PAPER BATTERY

- The battery produces electricity in the same way as the conventional lithium-ion batteries
- The devices are formed by combining cellulose with an infusion of aligned carbon nano tubes.
- The carbon gives the batteries their black color .

APPLICATIONS

- Pace makers in heart (uses blood as electrolyte)
- Used as alternate to conventional batteries in gadgets
- Powered smart cards
- RF id tags
- Smart toys, children sound books



Why To Use Paper Battery?



- Ultra-thin size & flexible structure.
- Exhibits property of super-capacitor(22F-36F per gram)
- Operating temperature(-75 to 100 degree celsius)
- provide both long-term, steady power production and bursts of energy.
- Cost-effective.



Advantages

- Biodegradable, Non Toxic & Biocompatible
- Easily Reusable, Recyclable & Rechargeable
- Durable & Long lasting
- No Leakage & Overheating
- Very Light Weight & Flexible
- Easily moldable into desired shapes & sizes
- Customizable output voltage
- Used as both battery and capacitor.
- It is ultra thin energy storage device.

Limitation

- ≈ Paper batteries have low strength they can be 'torn' easily.
- ≈ The techniques and the set-ups used in the production of Carbon Nano tubes are very expensive and very less efficient.

Paper battery offers future power

- ▣ The black piece of paper can power a small light.
- ▣ Flexible paper batteries could meet the energy demands of the next generation of gadgets.
- ▣ The ambition is to produce reams of paper that could one day power a car.
- ▣ The paper battery was a glimpse into the future of power storage.

Components

❖ CARBON NANOTUBES:

- ❑ Carbon nanotube is the main concept behind paper battery
- ❑ CNTs exhibit extraordinary strength and unique electrical properties, and are efficient thermal conductors.



❖ Paper Layer

Cellulose based paper



❖ LTO, LCO Electrolyte

❖ PVDF(poly vinylidene fluoride):

Paper is sandwiched between two electrolytes LTO and LCO with PVDF (poly vinylidene fluoride)



CONCLUSION

- A paper battery is a paper like device formed by the combination of carbon nanotubes and a conventional sheet of cellulose-based paper which act as a flexible ultra-thin energy storage and energy production device.
- As this technology is adapted it will prove to be extremely useful and could even save not only cost but lives also.

