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FUTURE EMERGING BATTERIES

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Abstract:

The principal use of batteries in the telecommunications industry is to provide standby or emergency dc power to telephone exchanges in the event of a failure or breakdown in the utility supply. Batteries are also used for standby power in microwave relay stations, for emergency lighting and a variety of other minor uses. Due to its low cost, long life and reliability the lead-acid battery dominates standby applications. Substantial developments are, however, in progress throughout the world to develop secondary batteries for use in electric vehicles and utility load-leveling. In addition, substantial improvements are being made in the development of compact, low-cost primary batteries such as those based on zinc-air and lithium technology. The characteristics of the lead-acid and nickel-cadmium systems are reviewed and the systems under development are then described together with their predicted characteristics and costs. The possible impact in the telecommunications industry of these new developments in battery technology is discussed.

Key words: Batteries, Telephony, industry, Communication Costs, Electric breakdown, Relays, Emergency lighting, Electric vehicles, Lithium.

1. INTRODUCTION

Batteries are the most common power source for basic handheld devices to large scale industrial applications. A battery can be defined as; it is a combination of one or more electrochemical cells that are capable of converting stored chemical energy into electrical energy.

A battery is a device, which consists of a various voltaic cells. Each voltaic cell consists of two half cells connected in series by a conductive electrolyte holding anions and cat ions. One half-cell includes electrolyte and the Electrode to which anions move, i.e. the anode or negative electrode; the other half-cell includes electrolyte and the electrode to which cat ions move, i.e. the cathode or positive electrode.

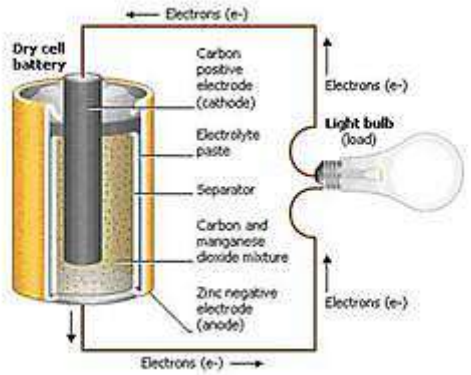


Fig. 1. Working of a battery

Equalization can be done by marginally over charging the battery to allow the weaker cells also to charge completely. The terminal voltage of a completely charged battery is12V, automobile battery shows 13.8V in its terminals while a 12 volt tubular battery will show 14.8V. Automobile battery should be firmly fixed in the vehicle to avoid shake. Inverter battery should be placed on a wooden plank if possible.

2. HISTORY OF BATTERIES

Batteries are so ubiquitous today that they're almost invisible to us. Yet they are a remarkable invention with a long and storied history, and an equally exciting future. A battery is essentially a device that

stores chemical energy that is converted into electricity. Basically, batteries are small chemical reactors, with the reaction producing energetic electrons, ready to flow through the external device.

Batteries have been with us for a long time. In 1938 the Director of the Baghdad Museum found what is now referred to as the "Baghdad Battery" in the basement of the museum. Analysis dated it at around 250BC and of Mesopotamian origin.

Controversy surrounds this earliest example of a battery but suggested uses include electroplating, pain relief or a religious tingle. American scientist and inventor Benjamin Franklin first used the term "battery" in 1749 when he was doing experiments with electricity using a set of linked capacitors.

The first true battery was invented by the Italian physicist Alessandro Volta in 1800. Volta stacked discs of copper (Cu) and zinc (Zn) separated by cloth soaked in salty water.Wires connected to either end of the stack produced a continuous stable current. Each cell (a set of a Cu and a Zn disc and the brine) produces 0.76 Volts (V). A multiple of this value is obtained given by the number of cells that are stacked together.

Fig. 2 History and development of Batteries

One of the most enduring batteries, the lead-acid battery, was invented in 1859 and is still the technology used to start most internal combustion engine cars today. It is the oldest example of rechargeable battery. Today batteries come in a range of sizes from large Megawatt sizes, which store the power from solar farms or substations to guarantee stable supply in entire villages or islands, down to tiny batteries like those used in electronic watches.

Batteries are based on different chemistries, which generate basic cell voltages typically in the 1.0 to 3.6 V range. The stacking of the cells in series increases the voltage, while their connection in parallel enhances the supply of current. This principle is used to add up to the required voltages and currents, all the way to the Megawatt sizes.

3. DISADVANTAGE OF BATTERIES

The main benefit of batteries is that they increase convenience for users since they enable portability of devices. Their biggest disadvantage is that they can only be used for a limited time. Even rechargeable batteries eventually die. Batteries come in various types including general purpose, alkaline, mercury and lithium, the newest and most advanced type. Most batteries do not need to be connected to an external electrical system, and this is a practical advantage in specific cases such as in cars, aircraft and many other portable devices that require power. Batteries can be used in places with no electrical supply such as remote rural areas. In such cases, batteries play a critical role in sustaining livelihoods. Another major advantage is that batteries are easy to replace once they go beyond their useful lifespan. On the downside, some batteries require maintenance and need to be checked periodically. Certain batteries are highly dangerous as they can explode, cause fire and lead to chemical pollution.

Rechargeable batteries take time to recharge, and this can be a big hindrance in case of an emergency. In case of larger equipment, batteries can increase their

weight, and this is a disadvantage when there is need to transport the equipment.

4. APPLICATIONS OF BATTERY

Batteries are small essential components to operate many devices. It is one of the key components in our day-to-day life. Some batteries are rechargeable batteries and are used in each and every sector. Below are some of the applications of batteries.

Fig. 3. Applications of Battery

4.1 IBM SEA WATER BATTERIES

IBM is developing what it's calling a more environmentally friendly battery that uses unique materials derived from seawater. Using three new proprietary materials extracted from seawater that haven't been previously used in a battery the company is hoping to develop more sustainable batteries that perform better.

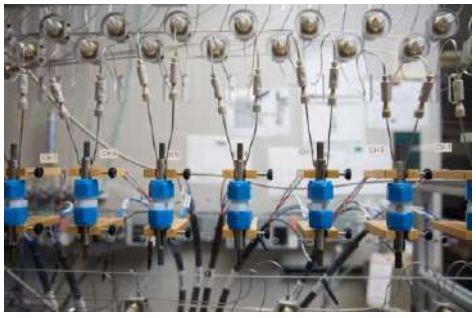


Fig. 4 SEA WATER BATTERIES

Right now, heavy metals like cobalt and nickel are commonly used in the design of current battery technologies, such as the rechargeable lithium-ion batteries in your smart phone, laptop or electric vehicle.

4.2 CAPTURING ENERGY FROM WIFI

Devices that convert AC electromagnetic waves into DC electricity are known as "rectennas". Rectenna captures Wi-Fi waves carrying the Wi-Fi and converts them into wireless energy using semi-conductor. Rectenna uses radio frequency to capture electromagnetic waves

AC Wi-Fi signal →semiconductor →DC voltage→ used to power electronic circuits or recharge batteries

FIG. 5 ENERGY FROM WIFI

4.3 URINE POWERED BATTERIES

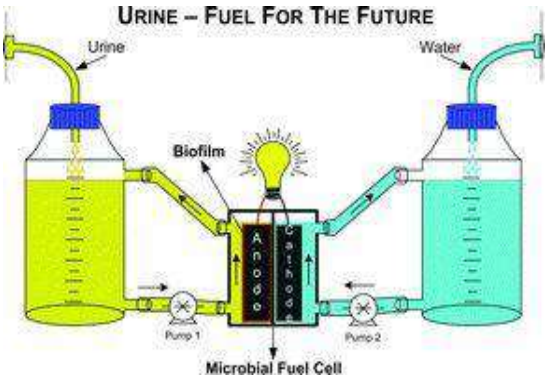


FIG. 6 URINE POWEWRED BATTERIES

Battery made with urea commonly found in fertilizer and mammal urine .To activate a battery ,a drop of urine is added and soaks through the sandwiched filter paper. The chemicals dissolve and react to produce electricity. The magnesium layer

acts as the anode, losing its electrons. the copper chloride acts as the cathode, mopping up the electrons.

4.4 FOAM BATTERIES

The foam is the raw material for the batteries, onto which the anode made of copper antimonite is electroplated. Rise in demand for renewable energy storage system and electric vehicles has fueled the demands for batteries globally

FIG7-FOAM BATTERIES

4.5 LITHIUM – SULPHUR BATTERIES

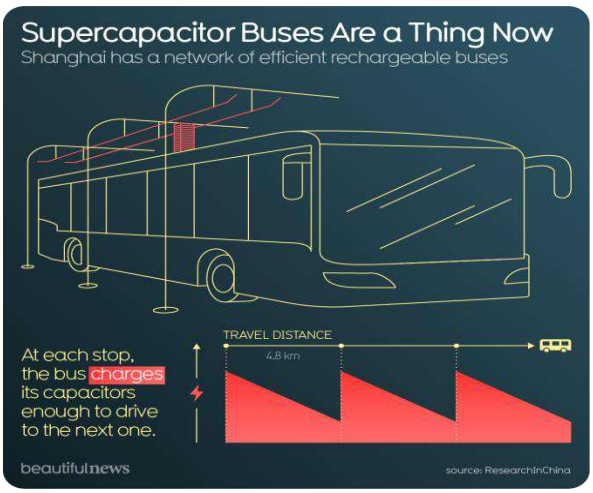


FIG. 8. LITHIUM SULPHUR BATTERIES

Lithium - sulphur battery that can power a Smartphone for 5 days, outperforming lithium-ion. Lithium-sulfur batteries can enable efficient electric transportation such as in unmanned aircrafts, electric buses, trucks, and locomotives.

- Specific energy : 450[Wh/kg]
- Energy density : 550[Wh/L

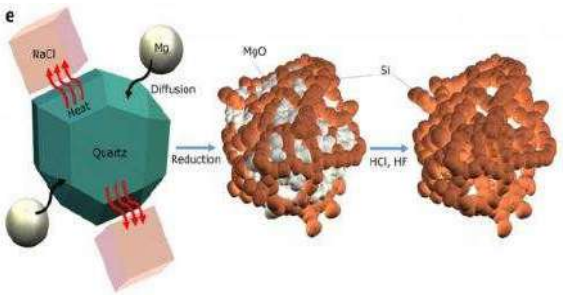
4.6 FOLDABLE BATTERIES

Not only mobile phones, but computers and tablets are getting screens that can be folded or rolled up. until now, lithium-ion batteries have generally provided the necessary energy for all these devices and applications. Nevertheless, they have a decisive disadvantage: they are heavy and inflexible now developed a prototype of a stretchable thin-film battery. This can be bent, stretched and even twisted without any loss in performance.

FIG.9. FOLDABLE BATTERIES

4.6 SAND BATTERIES

These Batteries are powered by “Silicon Extracted from Sand” which last three times longer than current lithium-ion batteries. The Process is quartz sand is heated and ground with salt and magnesium to remove any oxygen, resulting in pure silicon Pure Silicon is in a porous state which is used at the anode



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4.7 COBALT FREE BATTERIES

Researchers at the University of Texas have developed a lithium-ion battery that doesn't use cobalt for its cathode. It switched to a high percentage of nickel (89 per cent) using manganese and aluminum for the other ingredients. Cobalt is the least abundant and most expensive component in battery cathodes as per Researchers

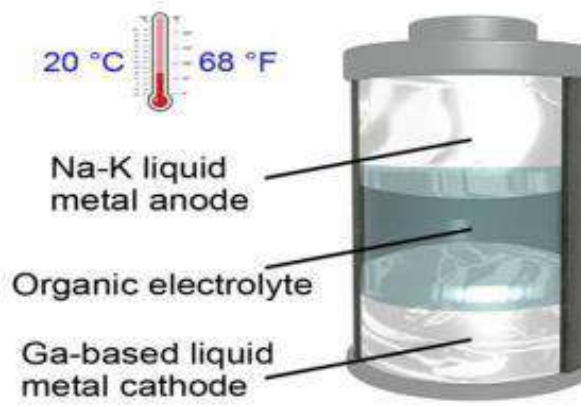

FIG. 10. COBALT FREE BATTERIES

4.8 SILICON ANODE BATTERIES

To overcome the problem of n stable silicon in lithium-ion batteries, researchers at University of Eastern Finland have developed a method to produce a hybrid anode, using mesoporous silicon micro particles and carbon nanotubes.

The aim is to replace graphite as the anode in batteries and use silicon, which has ten times the capacity. Also it improves the performance of the battery.

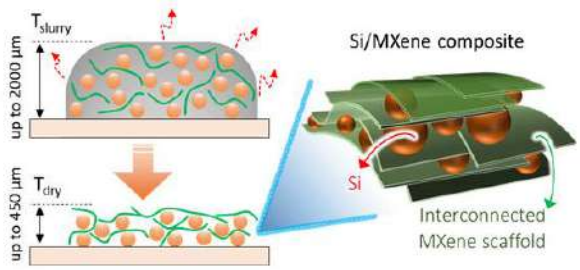

FIG. 11. SILICON ANODE BATTERIES

4.9 GOLD NANO WIRE BATTERIES

A nanowire battery uses nanowires to increase the surface area of one or both of its electrodes. Some designs variations of the lithium-ion battery have been announced, although none are commercially available. All of the concepts replace the traditional graphite anode and could improve battery performance

FIG. 12 GOLD NANO WIRE BATTERY

CONCLUSION

Future world depends upon the battery. I am extremely happy that these emerging batteries. Will help in communicating around the world

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