NEW GRAPHENE BATTERY CAN BE CHARGED IN JUST 15 MINUTES.

MR.PIYUSHKUMAR VASUDEVBHAI UPADHYAY

CHEMISTRY DEPARTMENT

Shri R.P. Arts, K. B. Commerce and Smt. B.C.J. Science College. Khambhat, Gujarat, India.

Abstract:-

A new type of battery has been developed that could revolutionise electric vehicle use with a recharge time of just 15 seconds. While technology is progressing in the electric bike sector on all these points, for most, the rate of progression is still just to slow. One factor that could improve the situation on two of the above mentioned fronts is recharge time. Reducing this to shorter amounts of time improves the deficit that electrically powered motorcycles have over their fossil fuels burning cousins. A battery with a recharge time of minutes, comparable to a petrol – powered bike, would go some way to alleviating the range anxiety that comes with electric motorcycle ownership, and quicker recharge times are just what this new graphene battery achieves.

Scientists have created a graphene 'super battery' that can be recharged in around 15 seconds. The lithium –ion cell is also capable of surviving a claimed several hundred thousand charge cycles, increasing the longevity of the cell when compared to a conventional battery.

Keywords:-

Battery, Capacity, Discharge, Efficiency, Electrodes, Graphene, Lithium-ion, Smart phones, Technology

Introduction:-

Graphene batteries are a new type of technology that allows for increased electrode density, faster cycle times, as well as possessing the ability to hold the charge longer thus improving the battery's lifespan. Graphene batteries are well established and come in many forms. Similar to graphite, there are now various types of functional graphene derivatives electrodes and researchers are discovering multiple benefits when compared to pure graphite electrodes. Our graphene battery user's guide includes four well established graphene electrodes designs of experiments (DOE) from cutting edge academic research including one for a Graphene-Lithium-Sulphur battery, the current front runner technology, and are included for reference. Graphene based batteries are being activity researched for many commercial applications. The improved-performance and life-cycle advantages when developing graphene-based batteries over traditional metal-ion batteries are well worth the resource investment. Elon Musk's Tesla Motors provides a famous example of innovative companies actively persuing graphene battery research and commercialization. We believe that the real graphene battery break through will be from graphene-lithium-ion hybrid chemistries incorporated into the cathodes of lithium-sulphur cells. This types of technology is still years away from commercialization and intensive research is ongoing. The more innovative graphene battery technologies will require significant R & D expenditures and will take many years to commercialized. Nowadays, zinc and alkaline based batteries are available, but they generally have a shorter lifespan due to their high charge density. Unlike lithium-based batteries, they can not operate at higher voltages. A primary (non-rechargeable) battery consists of two electrodes which allows the current to flow in one direction only, via an intermediary electrolyte. Secondary (rechargeable) batteries still consists of two electrodes however the lithium ions can flow in both directions depending on if charging or discharging. The anode is generally a lithium based (metal oxide) compound and the cathode a porous carbon. Both the anode and cathode have a rigid structure with defined holes, which allows for the absorption of lithium ions into the holes when the current is applied. When there is no current being applied, the ions desorb into the electrolyte solution. Absorption of the lithium ions can occur on both the anode and the cathode, when a battery is in use, the ions move to the cathode. When charging, the current is reversed and the ion absorb into the anode. This process allows for many cycles to be produced, learning to an enhanced lifespan.

Methods and materials:-

1. Vertical aligned carbon nanotube electrode.

NAWA technology has designed and patented an Ultra Fast Carbon Electrode, which is says it is a game changer in the battery market. It uses a Vertically-Aligned Carbon Nanotube (VACNT) design and NAWA says it can boost battery power ten folds, increase energy storage by a factor of three and increase the life cycle of a battery five times. The company sees electric vehicles as being the primary beneficiary, reducing the carbon footprint and cost of battery production, while boosting performance. NAWA says that 1000 Km range could become the norm, with charging times cut to 5 minutes to get to 80 per cent.

2. A cobalt free lithium-ion battery

Researchers developed a lithium-ion battery that does not use cobalt for its cathode. Instead it switched to a high percentage of nickel (89 percent) using manganese and aluminium for the other ingredients. " cobalt is the least abundant and most expensive component in battery cathodes", said one researcher. Researchers also told that we are completely eliminating it. The team says they have overcome common problems with this solution, ensuring good battery life and an even distribution of ions.

3. A step closer to silicon anode lithium –ion batteries.

Looking to overcome the problem of unstable silicon in lithium-ion batteries, researchers have developed a method to produce a hybrid anode, using meso porous silicon micro particles and carbon nano tubes. Ultimately the aim is to replace graphite as the anode in batteries and use silicon, which has been ten times the capacity . Using this hybrid material improves the performance of the battery, while the silicon material is sustainably produced from barley husk ash.

4. Lithium-sulphur-batteries could outperform Li-ion have lower environmental.

Researchers have developed a lithium-sulphur battery that can power a smart phone for 5 days, out performing lithium-ion. The researcher have fabricated this battery, have patents and the interest of manufacture. The group has funding for further research in 2020, saying that continued research into cars and grid use will continues. The new battery technology is said to have a lower environmental impact than lithium-ion and lower manufacturing costs, while offering the potential to power a vehicle for 1000 Km (620 miles), or a smart phone for 5 days.

5. IBM's battery is sourced from sea water and out-performance lithium-ion.

IBM research is reporting that it has discovered a new battery chemistry that is free from heavy metals like nickel and cobalt could potentially out-perform lithium-ion. IBM research says that this chemistry has never been used in combination in a battery before and that the materials can be extracted from sea water.

6. Panasonic battery management system:-

Panasonic says that its new technology can be easily applied with a change to the battery management. System, which will make it easier to monitor and evaluate batteries with multiple stacked cells, the sort of thing you might find in an electric car. Panasonic that this system will help the drive towards sustainability by being able to better manage reuse and recycling of lithium-ion batteries.

Results and discussions:-

Smart phone battery technology is pretty good these days. But if three is one thing gadget lovers will never be able to get enough of it's the promise of better battery life. Would not it be great, if our handsets lasted two or three full days of heavy use with just a single charge? What about a whole week? With graphene batteries this might not be such a pipe dream. Graphene batteries are not powering smart phone and other gadgets just yet, but the technology is

progressing. In the future, graphene could be the material that replaces the lithium-ion batteries that the technology has become so reliant on for decades.

Key benefits of graphene battery technology include:-

Smaller, slimmer battery, we have already discussed how graphene is light weight. It is when you stack 3 million layers of graphene is that you get 1 mm thickness. I mean, that should be enough to tell you that graphene batteries are not going to take much space in your future smart phone. It will allow manufactures to place higher capacity batteries in your phones, tablets, laptops, and more.

Higher capacity:-

Graphene has a higher energy density as compared to lithium-ion batteries. When the latter is known to store up to 180 Wh per kilogramme. Graphene's capable of storing up to 1000 Wh per kilogramme So, you can have a higher capacity graphene battery pack of the same size as the lithium-ion battery. Other benefits include faster charging times, thermal management and grater safety. Graphene batteries are great for powering projects on breadboards, PCBs, and just about any circuit. They are very portable and come in a lot of form factors, with different voltage, current and power capabilities. If your circuit is in need of portable power or temporary power, batteries can be exactly what you need. Graphene batteries are said to be the absolute alternative to our current-gen. lithium-ion batteries. Graphene batteries are itself quite lightweight, advanced and powerful. Graphene has been found to be a superior material as it not only has higher electrical and heat conductivity, but it is also quite light weight, flexible and durable. Thus, graphene batteries have been under development for many years now and are expected to go mainstream in the next couple of the years. Graphene battery is a new technology, but it is does not mean they have not been tested. Manufactures have dedicated quite some time to graphene battery research and why would not they, especially when it's superior to the lithium-ion batteries. Graphene batteries have a number of benefits but the one shortcoming that is holding its mass adoption in our devices is mass production and costs involved in the same. Why is it difficult to mass-produce graphene batteries ? It is because of the lack of a feasible technique for the mass-production of high quality graphene. You certainly could produce graphene at home using graphite and sticky tape, but that does not work for the mass production of the batteries. The lack of the same also drives up production cost as quality of materials will need to be taken into account, which could as high as tends to thousands of dollars. Graphene batteries have extraordinary potential and yield results better than the existing battery packs-something that should have become quite clear to you by now. Research in this field has been quite rampant in the past couple of decades, but we will still need to be patient for its commercialization. Many companies are currently resting graphene batteries or are trying to improve lithium batteries with graphene to enhance their performance, but they are not fully commercially available at the moment.

Conclusions:- In terms of efficiency, graphene based batteries are quickly becoming comparable to conventional solid-state batteries. Thanks to the continuous advancement in graphene-based batteries, it will not be long before they outperform their soild-state predecessors. The additional advantages associated with graphene being present in the electrodes can be useful, even if the efficiency is not as high. Graphene batteries are an ideal option for batteries that possess a similar efficiency and because of this reason researchers are striving to further advance this class of batteries. Graphene batteries have started to gain interest in the commercial marketplace and it will not be long before these batteries become the norm and phase-out solid-state batteries. With ever-increasing energy demands all across the world, developing improved energy storage devices with reduced negative environmental impacts related to consumer based battery usages is a noble objective and one that cheap tubes definitely supports. Cheap Tubes hopes that this guide has helped you to know the current graphene battery research trends and inspired you to initiate graphene battery development.

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