

Battery technology- mobile and cars essay sample



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Introduction:

Battery electric cars are becoming more and more attractive with the advancement of new battery technology (Lithium Ion) that have higher power and energy density. The concept of battery electric vehicles is to use charged batteries on board vehicles for propulsion. Now a days Market requires batteries which are ecofriendly, long lasting and gives high performance. Mobile phones or Laptops or Radio etc. any Portable Electronic devices are in massive demand in market. Consumers now a days requires wireless environment. So there is need to manufacture high performance batteries.

What Happens To A123????

U. S. based battery maker A123 Systems, LLC develops and manufactures advanced Nanophosphate lithium iron phosphate (LiFePO₄) batteries and energy storage systems that deliver high power and energy density, long life, and excellent safety performance. The company's game-changing technology of using Nanophosphate technology is built on novel nanoscale materials initially developed at the Massachusetts Institute of Technology. A123 had main three product arms which includes Cells, Modules and Systems. Cells includes AMP20 prismatic pouch, AHR32113 Cylindrical, ANR26650 Cylindrical, APR18650 Cylindrical. Modules include AHR32113 Power modules, AMP20 Energy modules, and ALM lead Acid replacement batteries. Systems includes Grid Storage Solution, Energy core pack (23 KWH), Power core pack (110 KW), 12 V Engine start battery, ALM lead acid replacement battery. A123 filed for bankruptcy, was gambling on technology that wasn't advanced enough to help it overcome established manufacturers

and compete with them. A123's technology, based on nanoscale electrode powders, was safer and far more powerful than existing alternatives when it was introduced in 2006. The technology helped convince GM that lithium-ion batteries could be used in plug-in hybrids.

It results in development of the Chevrolet Volt. But big battery makers quickly wedged up. While they couldn't necessarily match A123's performance in all areas, they came close enough to meet the needs of automakers. As a result, A123 lost the contract for the GM's Volt to the Korean giant LG Chem, which used more conventional electrode materials but introduced a novel material to separate the electrodes and improve the safety of the batteries. Later then, A123 has signed several production contracts with major automakers, but those haven't been very large orders. It will not enough for the company to operate its factories at full capacity, which would have brought down costs. Major contracts for vehicles such as the Nissan Leaf, Ford's new Focus electric vehicle, and Toyota's plug-in Prius all went to more established battery makers. And although A123's technology was an improvement on existing batteries used in electric vehicles, it "wasn't good enough to let such cars, or plug-in hybrids, compete widely with conventional vehicles.

Though Lithium-ion batteries from A123 are more compact than the lead-acid and nickel-metal hydride batteries used in early generations of electric vehicles and hybrids remain expensive, accounting for perhaps \$15, 000 of the cost of a car. Electric vehicles are twice as expensive as their gasoline equivalents, in large part because of the batteries. A123 Marketing ABC goes wrong. Their wrong focus on the vision of an allelectric cars leads to failure.

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Cost of Electric vehicles is going high, compared to vehicles run on Gasoline. Despite having large capacity to produce batteries, due to less demand batteries will not sell. Consider Illustration: A tank with 100 pounds of gasoline, and a car will drag you 400 miles before stopping for a 10-minute refill. The same 100 pounds of lithium yields 40 miles and then a 10-hour refill. This process is really tedious and time consuming. The cost of the raw materials alone necessary to make the battery is higher than the cost of gasoline. Additional expense to manufacture a battery and its control systems. Gasoline and diesel fuel are outstandingly efficient in energy and economic terms. But they're not so useful for powering a smart phone.

Thus, the real opportunity for lithium battery companies resides with the latter. There is boom of wireless connections which requires more energy, and to ever brighter displays incorporates chase for better batteries for billions of smart phones is a huge market. And it's one where people willingly pay a high premium, in cost per unit of energy. The company that can make a radically better smart phone battery will own that market. This was not the market A123 chased. In May 2008 the U. S. Advanced Battery Consortium and the U. S. Department of Energy awarded A123 a \$12. 5-million grant to develop its lithium-ion battery technology for plug-in hybrid electric vehicles. In August 2009 the DOE awarded it a \$249-million grant under the government's Advanced Technology Vehicles Manufacturing Loan Program. In September 2009, A123 raised \$380 million through an initial public offering on the NASDAQ exchange. Despite all this company got Bankrupt. Now it is takeover by Chinese firm Wanxiang corp.

Technology Considerations for Battery:

Portable Electronic Devices, such as laptop, mobile phones and tablet computers charging process can be done with the help of the locally measured frequency of the electricity grid. The same technology could equally be applied in other battery powered applications such as electric vehicles. If this smart charging technique was incorporated into devices it would contribute significantly to the stability of the electricity grid that will help to mitigate the power production fluctuations from renewable energy sources. This will solve problem of Batteries for Portable devices. Lithium Air batteries are more powerful, lightweight than currently available. These added to more usefulness in Electric power vehicles. Carbon nanotubes discharge powerful waves of electricity under certain conditions called thermopower waves. Thermopower waves used to produce electricity which can be utilized in small electrical appliances or maybe in large-scale applications. Creating paper batteries and fabrics that can conduct energy.

Pieces of fabric and regular paper can be soaked in an ink that contains nanoparticles. The mixture of these particles leads to capacitors which stores large amount of energy. Scientists have found new material known as Palladium. This may turn out to be a hopeful substance in near future to power fuel cells and battery material. Advantage of Palladium has over other metals is, it is cheaper and more abundant. So we can go for this material for better reliability. Devices such as Mobile, Laptops and Vehicles not utilized energy fully. Some of the energy is lost in the form of friction or heat. For example when we are exploiting the power of computer processor chips, car engines or electric power plants there is a necessity of getting rid of excess

heat otherwise the equipment will not perform at their optimal level. This waste energy can be used in recharging our mobile, laptop or vehicle.

Emerging Technologies and Companies in Battery Technology:

Here are 13 rare battery start-ups working on next-generation manufacturing, chemistry and printing technologies. These battery companies could create innovation that could revolutionize electric cars, the power grid and how we charge up our gadgets and cell phones. Batteries are the essential part of our gadgets, and our cell phones, and they'll also one day remake our power grid and our vehicles. But battery innovation is difficult — it takes a long time to develop and commercialize new batteries, and it can also take a lot of money. Here are highlight of some of the rare next-generation battery start-ups out there that are using nanotechnology, new printing technologies, high-powered computing, and other innovations to produce the future's batteries. With a little luck, strong leadership, and maybe some government support, these battery start-ups could change the way the world stores energy.

1) Ambri: Ambri is one of the most well-known battery start-ups out there. Formerly called Liquid Metal Battery, the company was founded by MIT Professor Don Sadoway, who is probably the only battery start-ups founder ever to score an interview on The Colbert Report. It's also got investors Bill Gates, Vinod Khosla, and oil giant Total. Ambri is developing a battery for the power grid using molten salt sandwiched between two layers of liquid metal. The battery is still at least a year and a half from commercialization. 2)

Imprint Energy: Using zinc, instead of lithium, and screen printing technology, Imprint Energy has developed a battery that is ultra-thin,

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energy-dense, flexible, and low cost. Because the battery can be made thin and pliable, the company hopes to target companies making wearable's. Imprint Energy is already making small volumes of its batteries for pilot customers, and plans to ramp up to commercial scale manufacturing in a couple years. 3) Alveo Energy: Half-year-old start-up Alveo Energy is looking to develop and commercialize a battery made out of water, Prussian blue dye — which is used to colour things like blue jeans, crayons and paint — iron and copper.

The battery is meant to be ultra-low cost and long lasting, and if successful, could help deliver breakthrough energy storage technology for the power grid. The research behind the battery was done by Stanford PhD student turned entrepreneur Colin Wessells, and Stanford Professor Robert Huggins, and the company managed to snag a \$4 million grant from the Department of Energy's high risk early stage program called ARPA-E. 4) Pellion: Pellion went about finding the perfect battery chemistry in a totally disruptive way the researchers created advanced algorithms and computer models that enabled them to test out 10, 000 potential cathode materials to fit with its magnesium anode for its battery. Pellion co-founder, MIT Professor Gerbrand Ceder, also helped develop The Materials Genome Project at MIT, which is a program based on using computer modelling and virtual simulations to deliver innovation in materials.

5) Quantum Scape: Quantum Scape is an early stage stealth battery start-ups that is truly a product of Silicon Valley. The company is commercializing technology from Stanford University, it was founded by Infinera co-founder and CEO Jagdeep Singh, and it's backed by Kleiner Perkins Caufield & Byers

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and Khosla Ventures. The company is trying to create a battery — called the all-electron battery — that has the density of fossil fuels. The technology being used is a new method for stacking trace amounts of materials together. 6) Envia: A year ago battery start-ups Envia unveiled that its lithium ion battery technology could deliver an electric car with a 300-mile range for a cost of around \$25, 000 to \$30, 000. Founded in 2007, Envia developed a low-cost cathode and then paired that with a silicon carbon anode, and a high-voltage electrolyte. The company is backed by General Motors, Japanese giant Asahi Kasei, Pangaea Ventures, Redpoint Ventures and the DOE's ARPA-E program.

7) GELI: Start-ups GELI isn't making new types of batteries, but it's developing an operating system and software for grid batteries. Companies, building owners and utilities can buy GELI-enabled batteries and use the batteries for services like providing energy storage for solar systems, or for storing and discharging energy when the demand for energy becomes out of balance with supply. 8) Sila Nanotechnologies: Sila Nanotechnologies was founded in 2011 by Valley entrepreneurs working with the Georgia Institute of Technology. The company is building a lighter lithium ion battery that has double the capacity of current lithium ion batteries. The company received a \$1. 73 million grant from the DOE. 9) Boulder Ionics: Boulder Ionics is working on breakthroughs for the electrolyte part of the battery, which is the guts of the battery, where the ions flow across between the anode and the cathode. The company is developing an electrolyte made of ionic liquids that can function at high temperatures and voltages and is lower cost to make than the more standard way to make ionic liquids. 10) Prieto Battery:

The brainchild of Colorado State chemistry professor Amy Prieto, Prieto Battery is making a lithium ion battery that it says can charge in five minutes and last for five times longer than the standard lithium ion batteries. The company is leveraging nanotechnology to develop tiny copper nanowires that make up the anode of the battery, and the electrolyte is made of a solid polymer.

11) Sakti3: Sakti3 is a start-ups in Michigan that is building a lithium ion battery that is entirely solid state, and has a high energy density. Making it from solid polymers means it won't have those flammable liquids and could be a lot safer for electric cars. The company is backed by Khosla Ventures, GM Ventures and Itochu.

12) Xilectric: Xilectric is re-making the "Edison Battery," which traditionally has been a rechargeable nickel iron battery. But Xilectric is making it out of aluminium and magnesium, which it says will make it more low cost and with higher performance. The company was awarded a \$1. 73 million grant from the DOE

13) Amprius: Based on research from Stanford's Yi Cui, Amprius is working on lithium ion batteries that use a nanostructured silicon material for the anode. The nanostructured material could shrink the anode fourfold and allow a fourfold increase in energy density. The company has raised at least \$25 million from Trident Capital, VantagePoint Venture Partners, IPV Capital, Kleiner Perkins Caufield & Byers, and Eric Schmidt.

Market Scenario for Batteries in Portable Electronic Devices: Mobile phone and laptop sales have increased consistently by double digits in the last years. Now with the presence of smartphones and tablet PCs this trend will boost in the following years. This new age of communications, information and portability would not have been possible without energy storage

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solutions to power these portable devices. The annual units of laptops sold in India for the year 2009-10 were estimated at 2.5 million with a growth rate of 35% per annum. India has the world's second-largest mobile phone user base with over 929.37 million users as of May 2012. Lithium-ion battery (sometimes Li-ion battery or LIB) is a member of a family of rechargeable battery types in which lithium ions move from the negative electrode to the positive electrode during discharge, and back when charging. Li-ion batteries use an intercalated lithium compound as the electrode material, compared to the metallic lithium used in the non-rechargeable lithium battery.

Lithium-ion batteries are common in consumer electronics. They are one of the most popular types of rechargeable battery for portable electronics, with one of the best energy densities, no memory effect, and only a slow loss of charge when not in use. Beyond consumer electronics, LIBs are also growing in popularity for military, electric vehicle, and aerospace applications.

Research is yielding a stream of improvements to traditional LIB technology, focusing on energy density, durability, cost, and intrinsic safety. Chemistry, performance, cost, and safety characteristics vary across LIB types.

Handheld electronics mostly use LIBs based on lithium cobalt oxide (LCO), which offers high energy density, but have well-known safety concerns, especially when damaged. Lithium iron phosphate (LFP), lithium manganese oxide (LMO) and lithium nickel manganese cobalt oxide (NMC) offer lower energy density, but longer lives and inherent safety. These chemistries are being widely used for electric tools, medical equipment and other roles. NMC in particular is a leading contender for automotive applications. Lithium

nickel cobalt aluminium oxide (NCA) and lithium titanate (LTO) are specialty designs aimed at particular niche roles.

Market Scenario for Batteries in Electric Cars:

The heart of an electric car is its battery. Unlike the batteries in most cars, which primarily serve to start the engine and run accessories like the radio or air conditioner, the battery in an electric car runs everything. Most importantly, it runs the electric motor or, more precisely, it runs a controller which in turn runs the electric motor — so it needs to be powerful and long-lasting enough to take drivers where they need to go with a minimum of recharging. Until recently, no reliable, mass-producible batteries have been manufactured that could make electric cars competitive with gas-powered cars. However, that's beginning to change.

Sharp rise in oil prices, as well as the recession, automobile companies are busy developing new business models and sharpen their production facilities. Recognizing the high stakes involved, a number of governments are supporting advanced battery technology with generous subsidies. In the US, the federal government has announced a \$2 billion Advanced Battery Manufacturing Initiative (ABMI), which comes on top of an estimated \$10 billion in this sector. Following is list of Battery Manufacturers, Type of Batteries they produced and Carmaker they sold:

Battery Manufacturer Altairnano Amberjac Projects Ltd

Carmaker Phoenix Motorcars, Lightning Car Company, Proterra Multiple Automotive OEM's

Type of battery Lithium titanate Lithium iron phosphate, Lithium titanate,
Mixed metal oxides Lithium iron phosphate Lead-acid batteries Lithium-ion
Lithium-ion battery (Li-ion) Lithium-ion battery (Li-ion) Lithium-ion battery (Li-
ion) Lithium-ion battery (Li-ion) NiMH Lithium ion(Lithium iron phosphate)
Lithium-ion Lithium-ion

Axeon

Concorde Battery E-One Moli Energy Electrovaya EnerDel Johnson Controls
Li-Tec Battery GmbH Sanyo Valence Technology LG Chem GS Yuasa

Rolls-Royce Motor Cars, Modec, Allied Vehicles, RUF Automobile, Jaguar Cars,
Land Rover, Electric Car Corporation Kewet City-jet and Buddy models BMW
Mini-E Scheduled to provide batteries for future Tata motors vehicles and
Chrysler plug-ins Preproduction and prototype batteries for Think Global
Batteries for Daimler AG, Ford, Scheduled to provide batteries for XL Hybrid
Batteries for Daimler AG Provides NiMH batteries for Honda and Ford hybrid
vehicles and Suzuki Swift

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