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Research on whether lithium batteries can achieve pollution-free new energy vehicles and other new energy vehicles way

Dihao Zhang

Zhenhai High School, Zhejiang, Ningbo, China
Zhangdihao02@163.com

Abstract:
Under the conditions of rapid development in the world today, all kinds of new inventions emerge in an endless stream. Among them, new energy vehicles are developing rapidly around the world and have become the focus of research and development and application in major automotive countries. Firstly, this paper expounds on the strategic significance of developing new energy vehicles from the aspects of energy saving, emission and pollution-free, low energy consumption, and high efficiency. Compared with traditional LPG vehicles, new energy vehicles have an unknown advantage. However, can new energy vehicles really do good without harm, as we know? When we watch many electric car promotion exhibitions, we can always hear them speak highly of the product, but from the perspective of the manufacturer, they will also be vague about some potential problems in order to sell. For example, for electric cars, the pollution caused by the production of batteries and the disposal of batteries after they are scrapped has not been mentioned. While looking forward to the future development trend of electric vehicles, hybrid vehicles, and electric vehicles, we also do not forget to question their potential dangers. Through the investigation and analysis of information, this paper finally summarizes the advantages and shortcomings of electric vehicles and the prospects for the future of new energy vehicles.
Keywords: new energy vehicles, battery, pollution

1. Introduction

New energy trams are undoubtedly a familiar means of transport for many people now. As early as 2008, Tesla began researching the production of electric vehicles, and from 2008 to 2012, Tesla [1] sold more than 2,250 Roadsters in 31 countries. The Electric vehicle manufacturers believe that the tram has zero emissions, high efficiency, and low noise, and the tram can eliminate the original engine transmission fuel tank and other structures to make the car simpler and other advantages to promote the washing energy tram.
But as one of the most talked about topics in recent years, are trams really all good? There is also a lot of debate about whether Electric vehicles can really reduce environmental pollution. Among them, the processing of lithium, the main element in the production of Electric vehicle batteries, has become the biggest problem of whether trams can really be environmentally friendly.
In response to this problem, we decided to study whether trams can really protect the environment and reduce pollution emissions through data investigation and quantitative analysis, and put forward some valuable suggestions for environmental protection through research and investigation

2. Literature review

1. benefits of Electric vehicle

•1.1 Does not require fuel and therefore saves money on petrol
On average, gasoline cars cost more than $700 a year more than electric cars, which only pay $0.10 per kilowatt. That's equivalent to a gasoline car that uses less than $1 a gallon of gas.
•1.2 No emissions of pollutants, environmental protection
More than 177,758,804 kg of CO_2 emissions per year are reduced due to the use of electric vehicles
•1.3 Motors have high efficiency and lower maintenance costs
With fewer parts in an electric motor compared to a traditional non-electric vehicle, there is less chance of damage, which means you can save on operating costs!
•1.4 Better performance
The light nature of an electric car makes it accelerate fast-

er

2. Elements that can be used in the production of batteries

Tesla electric cars are mainly converted from traditional oil and diesel power generation to reserve batteries (mainly lithium batteries). There are many elements that can be used only for batteries, including four elements: nickel (Ni), cobalt (Co), manganese (Mn) and lithium (Li)

3. Method to make Battery

Step 1: Prepare positive and negative paste electrode parts, which are formed by coating metal foil on the conductive paste. The conductive paste of positive and negative electrodes is different:

- Cathode material is generally lithium metal oxide
- The negative electrode material is generally carbon material, the positive electrode slurry is composed of positive electrode active material ($LiCoO2$), conductive agent, and binder, and the negative electrode slurry is composed of negative electrode active material (graphite), conductive agent, and binder.

Step 2: Coating slurry on the metal foil. The prepared positive and negative electrode slurry is evenly coated on the metal foil (collection) to form a thin film (hereinafter referred to as coating). Aluminum foil was used for the positive electrode current collector, and copper foil was used for the negative electrode current collector. After coating, it is baked in a vacuum dryer.

Step 3: In order to ensure that the coating on the pole piece reaches a certain thickness, a special coating thickness adjustment roller is used for rolling treatment to complete the production of positive and negative pole pieces. Alternatively, the coating thickness can be measured using a screw micrometer.

Step 4: Cutting of pole pieces and separators Cut the positive and negative pole pieces to the specified size (all pole piece widths should be the same). In order to prevent direct contact between the cathode material and the anode material, a separator should be prepared. When cutting the separator, make sure it is slightly wider than the positive and negative tabs. A hob should be used when cutting.

Step 5: The electrode terminals are installed on the electrode sheets by spot welding or ultrasonic welding, and the electrode terminals are respectively installed on the positive and negative electrode sheets (hereinafter referred to as electrodes).

Step 6: Winding of Electrode Sheet and Separator The separator is sandwiched between the positive electrode sheet and the negative electrode sheet and wound into a cylindrical shape. Usually, use a special winding fixture; after the winding is completed, use a special electrode tape to fix the electrode sheet. The resulting object is referred to herein as an electrode body.

Step 7: The laminated film is processed using an aluminum film, which is processed into a container that can accommodate the electrode body. The processed aluminum film is called a pouch battery.

Step 8: Make a laminated container, put the electrode body into a soft bag, fold the mouth of the soft bag along the length direction, and heat press. Of course, the end where the electrolyte is injected will not be hot pressed for the time being.

Step 9: Inject the electrolyte solution into the vacuum glove box and seal it. Use a micropipette or the like to inject a certain amount of electrolyte solution from the unpressed end of the soft bag, and then seal the unheated end in the glove box. Working in the glove box requires the use of ceramic tweezers.

Step 10: Remove the sealed battery cell from the glove box, and the laminated lithium-ion battery cell is complete. Next, use a charge and discharge tester for initial charging to fully charge the battery. At this time, if there is the gas produced, it is necessary to exhaust the glove box. Depending on the type and shape of the battery, the downstream process (steps 4 to 10) is different; there are inherent manufacturing methods, but the manufacturing process is almost the same [2].

4. How Batteries work

Electricity is the flow of electrons along conductive paths such as wires. This path is called a circuit. A battery consists of three parts: an anode (-), a cathode (+), and an electrolyte. The cathode and anode (the positive and negative terminals of a conventional battery) are connected to the circuit. Figure 1 shows how the battery works.

Chemical reactions in the battery increase the number of electrons on the anode. This results in an electrical difference between the anode and cathode. You can think of this difference as an unstable accumulation of electrons. Electrons want to rearrange themselves to eliminate this difference. But they have their own way. Electrons repel each other and try to go where there are fewer electrons.

In a battery, the only place it can go is the cathode. However, the electrolyte prevents electrons from flowing directly from the anode to the cathode within the battery. When the circuit is closed (the wire connecting the cathode and anode), electrons will be able to reach the cathode. In the diagram above, electrons travel through a wire, lighting up a light bulb along the way. This is a way of describing how an electric potential causes electrons to flow in a circuit.

However, these electrochemical processes change the chemicals in the anode and cathode so that they stop donating electrons. Therefore, the amount of power the battery can use is limited.

When charging the battery, another power source, such as a solar panel, could be used to redirect the flow of electrons. The electrochemical process occurs in reverse, and the anode and cathode return to their original state and can deliver full power again [3].

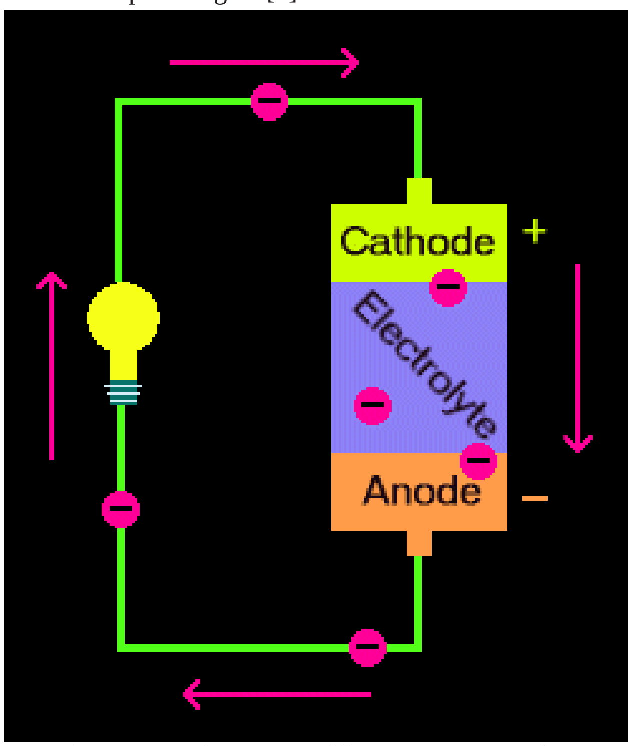

Figure 1. Diagram of battery operation

5. Charging connectivity modules – in-vehicle

Charging connectivity, which connects vehicles to the grid for efficient and optimized distribution of electricity, is a not terribly important part of our zero-emission future, Communication between the vehicle, the charging unit, and the grid is essential for charging the electric vehicle. For greater comfort, it may even be possible to connect the vehicle to the smart home. With two-way charging on the horizon, this exchange will require deeper interactions between consumers and energy providers within the vehicle. Available energy and energy providers need to be aligned with the current state of battery, user or smart home demand, which may include automatic billing capabilities.

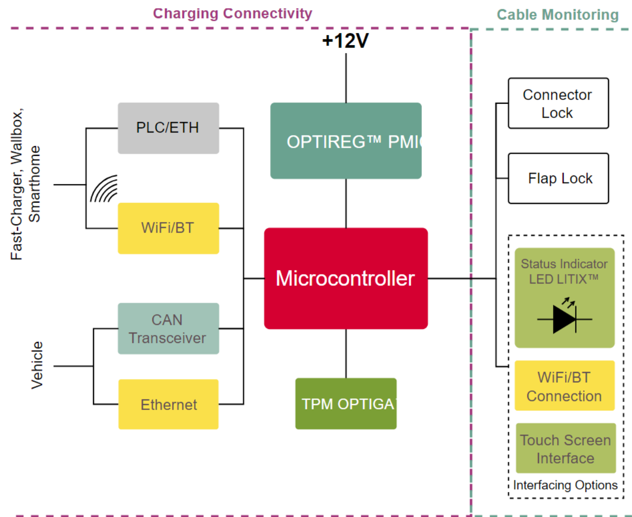

Figure 2. Charging pile principal diagram

Communication standards for this purpose are defined in ISO15118. With Infineon's expertise and broad product portfolio, we can help our customers develop solutions that meet the requirements defined in ISO15118 and beyond. The TPM module, in combination with the AURIX microcontroller family, enables secure communication, the WiFi/BT module complements power line communication and is associated with additional in-memory data that can be stored and updated locally, and the connection to the vehicle network is achieved via a CAN transceiver. These are just some of the key elements of developing a charging connection module. Figure 2 demonstrates the principle of the charging post [4].

6. The dangers of improper battery recycling

Informal disposal or reprocessing of batteries is not uncommon.

The demand for lithium-ion batteries (LIBs) is growing due to the development of electric transportation and auxiliary energy storage systems. In order to supply the needed batteries, the factory can only increase the production of batteries, which eventually leads to a large number of depleted batteries. The increasing cost of depleted batteries needs to be managed accordingly. However, at present, there is no uniform standard for lib waste disposal worldwide. Each country uses one or more practices, such as landfill, incineration, and full or partial recycling, most of which are set according to the number of batteries that leave the market, current legislation, and infrastructure. The environmental impacts, sources and pollution paths of waste lib is recorded, identified and classified in this paper.

The evidence presented here comes from real-life events, and he highlights the shortcomings of disposal practices and enumerates the threats associated with them. It shows that soil, water and air pollution can all be caused by improper or careless handling and disposal of waste batteries. The toxicity of battery materials not only poses a direct threat to organisms at various nutrient levels, but also poses a huge hazard to human health. Leaching, decomposition and degradation of batteries have been identified as the main causes of pollution, but violent incidents such as fires and explosions are also important. Finally, we discuss some of the major knowledge gaps for future assessment. To ensure the design and implementation of options for the safe disposal and disposal of waste LiBs, the current study provides a comprehensive overview of the threats and hazards that need to be managed.

For the pollution of lithium batteries to the natural environment, Hengyang City [5] tested some soil, water resources and air in its urban area in 2022, and we use water pollution to reflect the seriousness of pollution. The original water source had a ph of 7.5, chemical oxygen content of 12, ammonia nitrogen content of 0.075, chloride 3 content of 3.83, and total salt content of 226. The contents of cobalt and copper were all lower than 0.05

All values are currently standard, and within three days of adding lithium, the acidity of the land will drop from 7.5 to 4. Acidity increases significantly; in addition, other chemical elements, such as ammonia, nitrogen, chloride, total content, etc., will deviate from normal values [6].

7. Other Solutions

7.1 . Other forms of cars

Hyperion produces a new type of energy vehicle, which is powered by hydrogen compared to traditional petroleum cars and newer electric cars [7]. The maximum horsepower of a hydrogen car can reach 2038. It can accelerate 0-60 MPH in just 2.25 seconds, beating many powered cars in terms of maximum horsepower and acceleration. The car has all-wheel drive and can reach a top speed of 221 MPH. These are due to the high efficiency of his high-pressure fuel cells and hydrogen energy. In addition to being efficient, he also achieved fast charging. A hydrogen car can be recharged in just three to five minutes, and it can also be recharged by a simpler way of replacing the hydrogen battery. In addition, the most important point is as a new energy vehicle. Hydrogen energy vehicles do a good job of environmental protection, the product of hydrogen combustion is harmless to the outside world water, hydrogen energy vehicles will burn the product - water, in the form of water vapor discharged to the surrounding. Compared to waste such as carbon monoxide emitted by oil cars, water can be 100 percent environmentally friendly.

However, the shortcomings of hydrogen vehicles are also obvious. Too much hydrogen can easily cause an explosion. Hydrogen energy vehicles in environmental protection at the same time, its safety has become a problem that many people question, if there is a traffic accident, hydrogen vehicles may cause greater harm. This is also a problem that hydrogen vehicles are not yet popular and many researchers are working on.

In addition to the research and development and improvement of energy vehicles, we have also thought about other improvement methods to achieve low energy consumption and environmental protection. For example, use the computer network to program the information of all cars into the network, and all the cars will be adjusted through the computer. Artificial intelligence can strictly control the distance between vehicles to avoid collisions between vehicles. In this way, hydrogen energy vehicles can be safely put into use. However, these are also our assumptions about this method because through investigation, it is not difficult to find that building a huge information base to connect all cars requires not only the assembly of connectors while the car is being developed but also a large amount of money to build an information base. library. Even if such a huge amount of engineering can be realized technically, it is difficult to actually put it into use.

8. Conclusion

In recent years, with the vigorous development of traditional diesel locomotives, the traditional automobile industry has encountered severe challenges in terms of energy shortage and environmental pollution, so the world has paid more and more attention to the development of new energy vehicles, and the policy support for this industry is also increasing. In view of whether electric vehicles can really replace or even surpass LPG vehicles, our evaluation is that electric vehicles are far lower than existing petroleum vehicles in terms of fuel and pollution, but in terms of the amount of investment, in the face of the LPG vehicle system that has been established now, even if the energy cost of electric vehicles per operation is much lower than that of LPG vehicles. However, the cost of electric vehicles to build power stations and manufacture lithium batteries is not lower than that of LPG vehicles, and electric vehicles can not reflect their economic advantages in the short term, and in the long term, they will save money than LPG vehicles. In addition, the manufacture of lithium batteries will also produce some pollutants, so that electric vehicles are not 100% pollution-free. At the same time, improperly handled discarded lithium batteries will pollute water, soil and air to a greater extent. Therefore, the correct recycling of lithium batteries has become an important part of the development of electric vehicles. If all batteries are properly recycled, there is no doubt that electric cars can reduce pollution.

In addition, for other energy vehicles, such as hydrogen vehicles, they are more pollution-free than electric vehicles. The problems are more difficult to deal with, such as charging stations that are harder to set up, and collisions that may cause explosions, which have yet to be studied by researchers.

For the development of new energy vehicles, we hold the attitude of belief, and hope that he can bring us more amazing breakthroughs in the future.

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