

The Innovation Way of Fuel Cell New Energy Vehicle

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Abstract: China's automobile industry has made rapid development in recent years, but the environmental pollution caused by automobile exhaust is also very serious. In order to reduce the environmental pollution caused by automobiles, new energy automobiles have become the main development direction of the automobile industry. Fuel cells are one of the new energy sources. Although China has a very rich variety of fuels, the research and development of new energy vehicles is still in its initial stage and still faces severe tests.

Keywords: Fuel Cell; New Energy Vehicles; Innovation

Fuel cell vehicles have arisen with the development of automobile manufacturing. The development history of fuel cells can be traced back to the early 19th century, but due to the performance of batteries, they have not received much attention. In the 1990s, fuel cells for automobiles were developed. Subsequently, governments and major automobile manufacturers began to attach importance to the research and development of this project. After years of painstaking research and development, Toyota Company of Japan took the lead in making a breakthrough and officially began selling MIRAI, the world's first mass-produced fuel cell car, in Japan. Unlike pure electric vehicles, which require a long time to recharge, this fuel cell vehicle takes only three minutes to inject hydrogen fuel into the battery, and its range reaches 700 kilometers, but its 100 kilometers acceleration is slower than that of pure electric vehicles.

1. A brief introduction to new energy vehicles

1.1 Definition of new energy vehicle

Pure electric vehicles, hybrid vehicles and other new energy vehicles are non-oil driven vehicles. In addition, natural gas vehicle is a new energy vehicle with technical content. The common characteristic of these two kinds of cars is low emission, which is a new type of car that greatly reduces air pollution and city noise.

1.2 Current development of new energy vehicles in China

In recent years, China's energy automobile system has covered many regions. From the initial Tang, Song and Yuan Dynasties to the present hybrid model, it is conceivable that the degree of difficulty is such that society is continuously improving and hybrid models have gradually begun to be accepted by the public.

1.3 Actual development status of foreign new energy vehicles

1.3.1 Pure electric vehicles

Global automobile enterprises generally realize that clean electric vehicles can reduce energy consumption, further reduce pollution emissions, reduce noise and bring many benefits to the green environment while using new energy to promote technological innovation and research in the field of automobiles.

1.3.2 New hybrid electric vehicle

When Japan's automobile industry entered its mature stage in the first few years, the first hybrid car appeared in

1997. Therefore, there are many hybrid cars in Japan, among which Carola, Lei Ling and Camry are very well-known brands.

1.3.3 Fuel cell vehicles

The main energy conversion of fuel cell vehicles is to convert electric energy into electric energy after a series of treatments. Unlike modern new vehicles, fuel cell vehicles cannot store energy for themselves alone, so they are affected by various factors.

1.3.4 Power battery and its management system

Through investigation, it is found that batteries are currently a very important difference between new energy vehicles and traditional vehicles. Due to great difficulties in developing and producing batteries, automobile manufacturers must jointly develop new energy vehicles with battery manufacturers.

1.3.5 Vehicles with drive motor system

Permanent Magnet Synchronous Motor (PMSM) is an important part of the automobile market, which has the characteristics of small volume, light weight, fast speed, low production cost, etc.

2. A brief introduction to new fuel cell vehicles

2.1 Basic overview of fuel cells

Fuel cells convert chemical energy into electrical energy through a series of conversion processes. This technology is a new type of power generation technology after hydropower, thermal energy and atomic energy. In addition, fuel cells are mainly composed of natural gas, oil, methane and other substances. Therefore, hydrogen fuel cells are often used as fuel cells in public transportation vehicles.

2.2 Distribution of main types of fuel cells

The structure of a solid fuel cell is very similar to that of a traditional fuel cell. Its electric energy mainly depends on the chemical conversion of fuel gas and oxidizing gas, so its raw materials can also be natural gas and biomass. In addition, solid oxide fuel cells are also a kind of mobile energy, mainly used for large vehicles. The internal structure of unprocessed direct methanol fuel cell is very single, but it contains large energy, has high safety and reliability in operation, and can be better used under large temperature difference, which is of great significance for fuel filling.

2.3 Fuel cells will have certain promotion significance for social development

One of the main advantages of fuel cells is that in the process of national development, energy sources are diversified and technology reserves are abundant. As hydrogen is a secondary energy source, it can not only convert oil, coal and other energy sources into new hydrogen energy sources, but also include fuels such as ethanol and methanol, which plays an important role in some countries that rely on foreign oil imports. Fuel cells have been used in the aerospace industry for several years and are increasingly used in the civil field, especially due to their low noise, high mileage performance and wide range of applications in the military field, which is of great significance to the research and development of fuel cells.

3. Analysis of advantages and disadvantages of fuel cell new energy vehicles

3.1 Advantages of fuel cell new energy vehicles

There is hydrogen in the fuel cell, which reacts with oxygen in the air to generate electric energy to drive the motor and maintain the operation of the car. Since the chemical reaction involved in this process is the reverse reaction of water electrolysis, the reaction product contains only a small amount of carbon dioxide except water. Compared with conventional gasoline engines, carbon dioxide emissions are less than 50%. From a worldwide point of view, the most commonly used form of power generation is coal electricity. Pure electric vehicles require a relatively long charging time and have more electricity in both lungs. Therefore, when charging pure electric vehicles, carbon dioxide emissions will be relatively large. This shows that fuel cell new energy vehicles are more environmentally friendly, which is one of

their major advantages. Hydrogen fuel in fuel cells is relatively large and has high density.

3.2 Disadvantages of fuel cell new energy vehicles

Although fuel cell new energy vehicles have many advantages, they are difficult to popularize because they also have some disadvantages. First of all, the cost of fuel cell new energy is higher, which is one of the main factors hindering the development of new energy vehicles. This is because the fuel in the battery needs platinum as a catalyst when chemical reaction occurs. The cost of this metal is relatively high, reaching 250 yuan/gram. Assuming that a car has a power of 150kW, it needs 60g of platinum catalyst and the cost of the catalyst needs 15,000 yuan. With the cost of other raw materials, the total cost of such cars will be relatively high, and the selling price will naturally be high. Secondly, the service life of fuel cells is not long. The metal platinum catalyst will be gradually consumed in the use process, so the life of the entire fuel cell will be gradually shortened, which will indirectly increase the cost of fuel cell new energy vehicles. Thirdly, there is a lack of perfect infrastructure. As we all know, traditional cars need infrastructure such as gas stations and filling stations. So, to fully promote fuel cell new energy vehicles, it is necessary to fully build hydrogenation stations. Judging from the current situation, the United States and Japan have done a better job in this respect. China has only built a small number of hydrogenation stations in Beijing and Shanghai. The construction of the hydrogenation station requires high cost, but the income is not high, because the production cost of hydrogen is relatively high, which is another factor hindering the promotion of new energy vehicles for fuel cells in China.

4. Analysis of the new path of innovation and development of fuel cell new energy vehicles

4.1 The production cost of the battery is greatly reduced

Although fuel cell has some shortcomings, we must pay attention to its development prospect in the future. It has gradually become the most important way for new energy vehicles. With the acceleration of the development of fuel cell new energy vehicles, the first thing for us is to solve some related problems of battery production cost and service life. In the long run, we can also look at and deal with these two problems together. Their main purpose is to reduce the production cost and further improve the operation efficiency. As platinum is an important factor in the high cost of new energy for fuel cells and motor vehicles, researchers concerned with reducing the production cost need to do two things. The first is to reduce the use of platinum metal catalysts, and the second is to find relatively low-priced catalysts to replace this.

4.2 The same safety standards and systems must be formulated

After entering the 21st century, we have established the strategic goal of developing a powerful nation in the automobile industry. During the 11th Five-Year Plan period, we have proposed new plans to develop energy-saving automobiles and new energy sources. Therefore, during the 12th Five-Year Plan period, according to effective statistics from relevant social security departments, new energy automobiles are one of the seven new energy sources and have very strong political and financial support. The sales volume of fuel vehicles in our country still needs to be further improved. The sales volume of fuel cell new energy vehicles is relatively small, which is mainly affected by the price, safety, comfort and other factors. To some extent, this hinders the commercialization process of our new energy vehicles, thus hindering our further development in the automobile industry.

4.3 The construction of some basic facilities should be continuously improved

Although there are still many shortcomings in the new fuel cell vehicle, there is no denying that it has many advantages of its own. Especially the development of pure electric vehicles is far from the expected goal. In order to effectively alleviate some problems in energy shortage and environmental pollution in our country, it is of great significance to promote the use of new fuel cell energy vehicles. At present, in some foreign countries, fuel cell new energy vehicles are making significant technological progress. Therefore, China's major cities have also begun to speed up the construction of new fuel cell vehicles. China has also formulated many provisions to further promote the continuous innovation and industrial development of new fuel cell vehicles. To some extent, it has also ensured the extensive use and promotion of new fuel cell vehicles and effectively eliminated the negative impact of technology and

cost price.

5. Conclusion

In short, the manufacturing and operation process of a fuel cell vehicle can be relatively simple. It relies on the chemical reaction between hydrogen in the fuel cell and air to generate electric energy for the use of the vehicle. This principle is mainly based on the reverse reaction of water electrolysis, thus realizing zero pollution emission.

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