

# Application of Fireproof Coating for New Energy Vehicle Battery Pack

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**Abstract:** In the development process of new energy vehicles, the battery pack is one of the key parts, and the safety of the battery pack has always been an important factor affecting the application range and market sales of new energy vehicles. In order to improve the safety of battery packs, fireproof coatings are widely used on the surface of battery packs. This paper introduces the application of fireproof coatings in new energy vehicles by analyzing the composition and function of fireproof coatings.

**Keywords:** New Energy Vehicles; Fireproof Coating for Battery Pack; Application

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## 1. The composition and function of fireproof coatings

The main components of fireproof coatings are silicon-based hard materials, polyurethane and polyimide, etc., which have excellent insulation properties and high temperature resistance. Silicon-based hard materials can play the role of heat insulation and fire resistance, polyurethane and polyimide can decompose under the action of high temperature or fire source, release non-toxic gas to play the role of heat insulation and suppression of fire source. Fireproof coatings can form a fireproof protective layer on the surface of the battery pack, thereby preventing heat and current from directly passing through the battery pack wall into the circuit board and the battery interior.

The fireproof coating and the battery pack structure are closely combined to form an overall protection system, which can realize multiple functions such as heat insulation, heat preservation, fire prevention and explosion prevention. The fireproof coating can effectively alleviate the heat generated by the battery pack in the process of charging and discharging, and protect the safety of the battery pack. When the temperature of the battery pack is too high, the role of the fireproof coating is more obvious to prevent the battery pack from overheating and a safety accident.

## 2. The application of new energy vehicle battery pack fireproof coating

### 2.1 Flame retardant paint

Flame retardant coating is a coating that will delay the combustion process of the substance as much as possible. Some flame retardants, accelerants and other substances are added to the flame retardant coating to form a protective film on the surface of the battery pack, which reduces the risk of battery fire, but also can inhibit the spread of fire, delay the fire and burning time. Flame retardant coatings can reduce the ignition temperature of the battery pack, enhance the fire resistance, and improve the safety and stability of the battery.

### 2.2 Aerosol coatings

Aerosol coatings are coatings composed of fireproof aerosol particles and air. Fireproof aerosol particles form a fireproof film on the surface of the battery pack, which can effectively isolate the flame and play a role in fire protection. Aerosol coating has the advantages of non-toxic, tasteless, no pollution to the environment, and it is easy to operate and safe to use.

### 2.3 High temperature resistant paint

High temperature resistant coating is a kind of polymer as the main component, with excellent temperature resistance and flame retardant coating. The high temperature resistant coating forms a protective film on the surface of the battery pack,

which can inhibit the oxidation and corrosion of the battery pack and improve the safety and stability of the battery.

## **2.4 Creep material coatings**

Creep material coating is a kind of material which has the function of buffering energy absorption and self-healing. The creep material coating can form a self-repairing protective film on the surface of the battery pack, and has good anti-wear, anti-corrosion and fire-proof properties. Creep material coatings are highly durable and can maintain function during continuous cycle battery use.

## **3. New energy vehicle battery package fireproof coating application area**

### **3.1 Power battery box**

The power battery box is one of the most important components of new energy vehicles, often composed of multiple battery cells. Its safety performance is key, because once a failure occurs, it may cause accidents and serious losses. Therefore, the application of fireproof coating on the surface of the power battery box can improve its fire resistance, so as to ensure the safety of the power battery box. Fireproof coating is a protective film that can form a layer to prevent the spread and spread of the accident fire, reduce the temperature of the failure, and improve its fire protection level. Better fire retardant coating has the advantages of high efficiency fire prevention, good stability, non-volatilization, strong durability, etc., can be used in a variety of environments, is the ideal choice for power battery box fire protection.

The application of fireproof coating on the external surface of the power battery box can form a protective film, which plays an important role in the fire rating and battery temperature. Fireproof coatings can reduce the fire temperature and flame retardant degree of the power battery box, improve its fire rating, prevent it from overheating in extreme environments leading to fire and explosion accidents, and effectively protect the safety of the battery box.

### **3.2 Electric vehicle battery system assembly**

With the continuous expansion of the new energy vehicle market, the safety of new energy vehicle battery packs has been widely concerned, and fireproof coatings have become an effective measure to improve the safety and stability of battery packs. Fireproof coatings can reduce the temperature and heat inside the battery pack, improve the service life and cycle life of the battery, thereby protecting the safety and reliability of the battery pack. In the part of the electric vehicle battery end, coated with fireproof paint can reduce the temperature rise in the electric vehicle battery, so as to ensure the healthy operation of the electric vehicle battery, improve the performance of the electric vehicle battery, and extend the battery life.

#### **3.2.1 Increase the energy density of the battery pack**

Applying a fireproof coating can increase the energy density of the battery pack precisely because the fireproof coating can reduce the temperature and heat of the battery pack. Improving the energy density of battery packs is one of the trends in the development of electric vehicle industry, in which fireproof coatings play a role that cannot be ignored.

#### **3.2.2 Protect the adaptability of the battery pack application environment**

During the operation of electric vehicles, battery packs are faced with a variety of complex application environments, such as high temperature, low temperature, vibration and shock. The fireproof coating can ensure the stable and reliable operation of the battery pack in complex environments and high pressure conditions. Its application can not only improve the safety and service life of the battery pack, but also adapt to the complex working environment and working pressure requirements.

#### **3.2.3 Improve the stability and safety of the battery system**

Fireproof coatings can improve the stability and safety of the battery system, reduce the safety risks caused by high temperature and fire sources that may be generated during the charging and discharging process of the battery pack, ensure the efficient and stable work of the battery system when the electric vehicle is driving, and reduce vehicle safety accidents.

### **3.3 Charging pile and charging station**

In the process of the development of new energy vehicles, the construction of charging equipment and its facilities plays a crucial role. However, with the increase in the number of electric vehicles, the safety of charging equipment and facilities is also becoming more and more attention. In order to ensure the safety and reliability of charging equipment and facilities,

fireproof coatings for new energy vehicle battery packs have become a key solution in the application of charging piles and charging stations.

### **3.3.1 The application of fireproof paint on charging equipment**

Charging equipment is an indispensable supporting facility in the use of new energy vehicles. It is crucial to improve the safety performance of charging equipment and is an important support for the development of new energy vehicles. The use of fireproof coatings in charging equipment can prevent the equipment from high temperature and flammable problems during long-term operation, and ensure the safety and reliability of charging equipment.

The principle of the application of fireproof coating is to cover the surface of the battery pack with a fireproof coating protective layer, which can play the role of heat insulation and fire prevention, and can effectively reduce accidents such as high temperature, discharge and other electronic loss of control, so that the charging equipment can operate stably.

### **3.3.2 The application of fireproof paint in charging stations**

Charging station is the charging infrastructure of new energy vehicles. As the supply station of new energy vehicles, its safety and reliability are particularly important for users. The application of fireproof coatings in charging stations can effectively improve the safety and reliability of charging stations, and provide safer charging services for charging users.

The electronic devices inside the charging station, such as charging piles and supporting equipment, use fireproof coatings to effectively isolate the fire source and maintain the safety and stability of the charging equipment and battery pack performance. The use of fireproof coatings in charging stations can also strengthen the isolation effect between the charging pile and the battery pack, reduce the discharge temperature, and reduce energy consumption while ensuring safety.

## **4. The future development of fireproof coatings in the field of new energy vehicle safety**

### **4.1 Improve the fire resistance of fire retardant coating**

Although the current fireproof coatings on the market effectively reduce the safety risk of battery packs, its performance advantages and disadvantages and service life are far from meeting the safety requirements of new energy vehicles. Therefore, the next step needs to develop a more effective fireproof coating to prevent battery pack fire and explosion, and improve the density, heat resistance, corrosion resistance and wear resistance of the fireproof coating to better adapt to the complex application environment of new energy vehicles.

### **4.2 Apply new fireproof coating materials**

Traditional fireproof coating materials have certain limitations in terms of fire performance and service life, and cannot fully meet the evolving electric vehicle market and changing safety needs. Therefore, it is necessary to develop new fireproof coating materials, such as cobalt-based, polymeric materials and inorganic-organic composite materials, to enhance the fireproof performance of fireproof coatings while ensuring their service life.

### **4.3 Improve the combination of fireproof coating and battery pack**

The solid combination of fireproof coating and battery pack is the main part of the fireproof coating in terms of performance improvement and safety protection. Therefore, it is necessary to improve the combination of fireproof coatings and electric vehicle battery packs in the future, and increase the fire performance of fireproof coatings in complex environments and high pressure conditions.

## **5. Conclusion**

Fireproof coatings are an important safety measure that can extend the service life of battery packs and improve the safety and reliability of new energy vehicles. The future still needs to continue to develop more advanced fire retardant coatings to adapt to the rapid development of electric vehicle technology.

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