Energy storage for electric vehicles kiev

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Battery-powered Vehicles (BEVs or EVs) are growing much faster than conventional Internal Combustion (IC) engines. This is because of a shortage of petroleum products and environmental concerns. EV sales have grown by 62 % globally in the first half of 2022 as compared to the first half of 2021.

Every Country and even car manufacturer has planned to switch to EVs/PHEVs, for example, the Indian government has set a target to achieve 30 % of EV car selling by 2030 and General Motors has committed to bringing new 30 electric models globally by 2025 respectively. Major car manufacturers are Tesla, Nissan, Hyundai, BMW, BYD, SAIC Motors, Mahindra Electrics, and Tata Motors.

The success of electric vehicles depends upon their Energy Storage Systems. The Energy Storage System can be a Fuel Cell, Supercapacitor, or battery. Each system has its advantages and disadvantages.

A fuel cell works as an electrochemical cell that generates electricity for driving vehicles. Hydrogen (from a renewable source) is fed at the Anode and Oxygen at the Cathode, both producing electricity as the main product while water and heat as by-products.

A supercapacitor (sometimes Ultra-Capacitor) is the same as a battery that can store and release electricity. In a supercapacitor, no chemical reaction happens rather than charge is stored statically.

As no chemical reaction is involved in a Supercapacitor for storing electric charge, it can be charged or discharged within some seconds giving very high Power density and low Energy density among all other storage systems.

Supercapacitor electric buses are very common in China. Sunwin (a joint venture of Volvo and SAIC) brought SCs electric buses with the autonomy of 3 to 6 km. Buses are charged at each bus stop with a pantograph.

The battery is the most commonly used in present-day EVs. It converts the electrochemical energy into electrical energy. Li-ion battery is very promising for EVs as compared to the Lead-acid battery, the nickel-cadmium battery (Ni-Cd), and the Nickel-Metal Hydride battery (Ni-MH).

This battery is the first commercial secondary battery that dominated the market for more than a century. In this battery lead and lead oxide are converted to lead sulfate. Sulphuric acid which is the electrolyte in this battery acts as a reactant and ionic transport carrier.

The lead-acid battery does not have good energy density so it is mainly used as an auxiliary battery in vehicles to power the internal circuit and to start the motor(starter) of vehicles.

Nickel-cadmium battery has comparatively more energy density than Lead-Acid battery. The anode is made up of Nickel and the cathode is made up of Nickel-oxide and an aqueous alkali solution is used as an electrolyte.

Ni-MH batteries have 2-3 times more energy density than Ni-Cd. The positive electrode mainly consists of nickel hydroxide as active material, the negative electrode consists of hydrogen-absorbing alloys, the alkaline electrolyte is used and the separator is made of fine fibers.

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