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SURVEY ON LATEST BATTERY TECHNOLOGY FOR ELECTRICAL VEHICLE

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Abstract— Now days different many model of vehicle running on cities and highways all over world. These all vehicle are main contributors to release toxic gas and emission, which very badly effect on human health. Electrical operated vehicle technologies replaced this internal combustion engine in few times. For protection of earth, environment and human being Indian government decided to more focus on clean vehicle fuel source by promoting Electric and hybrid vehicles are based on green energy technologies. Because fossil fuels exhaust more polluted emissions and also fuel cost increasing day by day and also its few availability of its sources. Electric and hybrid vehicle economic benefit and great environment protection over petrol and diesel vehicles with the more rigorous regulations on emissions and global warming, fuel economy, and constraints on energy resources, hybrid, the electric, and fuel cell vehicles have Attracted more and more attention by automakers, governments, and customers. This review paper study the various recent advanced battery technology and their performance on state of the hybrid, electric and fuel cell technology vehicles and enabling technologies are discussed.

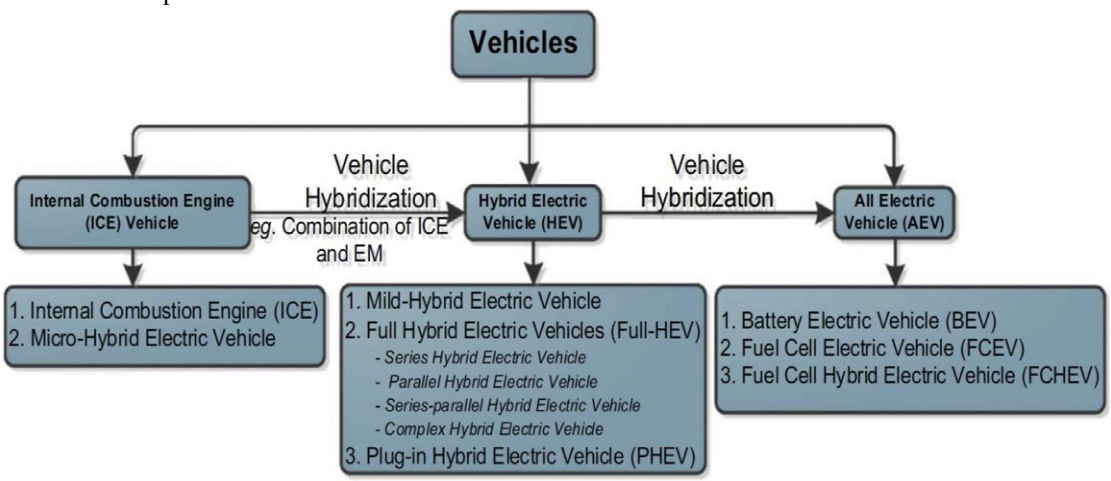
Keywords— Electric vehicle, Battery, Fuel cell, Hybrid vehicle, Emission, Green energy

I. INTRODUCTION

Our human being required a sustainable healthy, safe, reliable clean environment and secure energy demand around the world. Electrical vehicles can reduce pollution and their life cycle emission up to zero and protect the environment by using alternative source like renewable source including (solar energy, wind energy, wave energy), fuel cell, domestic source including coal, nuclear, natural gas. Using Electrical energy as vehicle fuel give advantage which not available in conventional internal combustion engine vehicle. In electric car Electric motor reacts very quickly, very responsive and have very good torque. Electric car required a charging which is available at many sources like a at home, at work, on the road. Electric vehicle plug in just like a smart phone at electrical source and charged battery in few hours.

In India new Delhi march 2019 recorded the highest level of monthly fuel consumption. Our country consumed 2577 thousand tonne of petrol in march and 2404 thousand tonne in February. Petrol used in year 2018-2019 is 28284 thousand tonne and 26174 thousand tonne recorded in the 2017-2018.

There are three types of Electric cars under three main categories. These include battery electric vehicles (BEVs), hybrid electric vehicles (HEVs) and Fuel cell electric vehicles (FCHEVs). The fuel cell is a fueled by hydrogen generated by mixing water and lithium hydride. Fuel cell system is compact but the platinum catalyst is very expensive. Vehicle classification carried out according hybridization factor. Hybridization factor, which is the ratio of the electric motor (EM) power to the total power



VARIOUS CLASSIFICATION OF VEHICLE

CHARACTERISTICS OF BATTERY, HYBRID AND FUEL CELL ELECTRICAL VEHICLES

Types of EVs	Battery EVs	Hybrid EVs	Fuel Cell EVs
Propulsion	• Electric motor drives	• Electric motor drives • Internal combustion engines	• Electric motor drives
Energy system	• Battery • Ultracapacitor	• Battery • Ultracapacitor • ICE generating unit	• Fuel cells • Need battery / ultracapacitor to enhance power density for starting.
Energy source & infrastructure	• Electric grid charging facilities	• Gasoline stations • Electric grid charging facilities (for Plug In Hybrid)	• Hydrogen • Hydrogen production and transportation infrastructure
Characteristics	• Zero emission • High energy efficiency • Independence on crude oils • Relatively short range • High initial cost • Commercially available	• Very low emission • Higher fuel economy as compared with ICE vehicles • Long driving range • Dependence on crude oil (for non Plug In Hybrid) • Higher cost as compared with ICE vehicles • The increase in fuel economy and reduce in emission depending on the power level of motor and battery as well as driving cycle. • Commercially available	• Zero emission or ultra low emission • High energy efficiency • Independence on crude oil (if not using gasoline to produce hydrogen) • Satisfied driving range • High cost • Under development
Major issues	• Battery and battery management • Charging facilities • Cost	• Multiple energy sources control, optimization and management. • Battery sizing and management	• Fuel cell cost, cycle life and reliability • Hydrogen infrastructure

II. LITERATURE SURVEY

Tabbi Wilberforce et al Fuel cells technology to be used into the transport industry is constantly gaining attention by the automobile industry. The benefits of PEM Proton exchange membrane type fuel cell devices over the traditional Internal combustion engine continue to make them a better choice for the automobile industry due to their low emission and high efficiency. In this paper charts the recent trend of fuel cell and electric cars, hydrogen electric cars. This paper explains some of advanced designs of electric cars on the automobile market that uses this new technology with their technical specifications. Main challenges is expansion of fuel cells technology in the automobile industry is carefully studying in this investigation. Low durability, High cost, hydrogen refueling infrastructure and hydrogen storage on fuel cell vehicles play key roles in hampering the expansion of this useful technology in the automobile industry. The mechanical durability is an important performance indicator for fuel cell technology used in automobile transport applications. This paper suggest by without degrading the fuel cell performance lowering the platinum content and finding platinum free catalysts which are very useful for reducing cost of the power generated from fuel cell. This paper study the main challenges faced by using PEM Proton exchange membrane fuel cells in the automotive industry and some latest modifications of the existing technology that are used by the industry to cut down the cost of cars designed to use fuel cells technology for providing high power. All the three categories of electric cars were reviewed and their power conversion technologies were explored. The state of the art FCHEV technologies as well as their future prospects were accessed. The advantages and disadvantage of each type of electric vehicle were analyzed in details. This paper concludes the future of the worldwide automobile industry is highly dependent on electric cars but more work still needs to be complete by the industry and academic researchers to reduce the overall cost of the ownership of electric cars and to improve the infrastructure necessary to service and maintain them. With increasing car usage in many countries around the world and dwindling reserve of the traditional sources of transport fuels, the necessity to change course and develop new means of powering vehicle is a necessity. Current developments in both vehicle and fuel cells technologies provide a promising solution for the problem. Sourcing of hydrogen from clean renewable fuel sources such as solar or wind energy will lead to a better solution for transportation fuels requirements and cleaner environment.

Sergio Manzetti, Florin Mariasiu Hybrid and Electric vehicles are based with green energy technologies and a low emission of green house gases give contribution to reduce pollution and fuel-economic benefits over gasoline and diesel vehicles. Electric vehicle batteries as metal system give the high optimal red/ox potentials and give electro chemical to generate electric current. However, their analysis and lifecycle of their use shows that batteries are produce with pollution and environmental burdens, and the need to innovate bio-dependent systems and bio logically degradable for

battery structures is eminent, if the sector of electric transport is to be subjected to a sustainable development. The technologies with in green chemistry solutions systems which depend up on aromatic rings, which quickly provide good use carbon, nitrogen and oxygen as main compounds and charge-transfer properties,. However, only a few of carbon-based technologies are developed to test able battery systems, and more are required to be developed in order to make the field of electric vehicle powering sustainable and portable electricity. The use of enzymes and biological systems to generate portable electricity finds relevance in several theoretical however few empirical achievements. Their structures rely on the generation of electric current from formation of gradients across membranes, and can therefore provide portable electricity up to milli watt levels. Bio batteries, Solar-cell technologies, can be a promising avenue of green battery technologies for the future and can reduce the environmental burden compared to present day metal-lithium means lithium ion batteries, for both portable systems as well as the automotive industry.

Antony Potter, Stephanie Graham **S**upplier involvement literature and eco-innovation, our results suggest that supplier alliance partner diversity and eco-innovation capabilities can influence the development of inter-organizational eco-innovations. They contribute to the eco-innovation literature by undertaking one of the first empirical studies of the determinants of inter-organizational eco innovation when suppliers are involved in NPD. Using the research context of the Toyota supplier association, our empirical analysis reveals that supplier electric capabilities and hybrid capabilities are associated with a significant increase in the degree of eco innovation co-patenting. They conclude that for the extent to which alliance partner diversity moderates the relationship between supplier eco-innovation capabilities and co-parenting. Finally, we have also identified some of the similarities and differences between Japanese automakers in how they develop inter-organizational eco-innovations within their supplier networks.

Zeinab Rezvani, Johan Jansson, Jan Bodin The first objective of this author study a comprehensive overview of the drivers for and barriers against consumer adoption of plug-in Electrical Vehicles. The second objective is to identify limitations and gaps in existing research and suggest a research agenda for the future. ‘‘Testing new technology, lowering environmental impacts, government grants and improving the organization’s public image’’ generally influence the fleet manager’s decision to adopt Electric Vehicles, EVs by fleet managers in different countries with different governmental incentives to identify the factors wjich influence the fleet manager’s adoption decision. Driving and experiencing an EV at work can potentially affect the drivers to adoption Electric Vehicles as a private car or not.

C. C. Chan **H**as presented an overview of the state of the technology of EVs, HEVs, and FCVs. With the ever more harsh constraints on environmental concerns and energy resources, HEVs attracted more interest from the automobile industry and the consumer. Although the market share is still insignificant today, it can be predicted that HEVs will gradually gain popularity in the market due to the superior fuel economy and vehicle performance. simulation and Modeling will play important roles in the success of HEV development and design. Control is the prime key technology in HEVs, hence the control theory of HEVs should be further advanced.

Dominica Notter, Marcelgauch, Rolfwidmer Patrickw, Ager Li-ion battery used in Battery operated Electrical Vehicles for transportation service is relatively small. It is the operation phase that remains the dominant contributor to the environmental burden caused by transport service as the electricity for the BEV is not produced by renewable hydro power energy. The small impact of the battery on the overall test of transport service is the small share of the lithium components on the environmental burden for the Li-ion battery. lithium content accounts for only 0.007 kg per kg Li-ion battery. Thereby, the lithium content of the active material (LiMn2O4) and the lithium in the electrolyte is included. Numerous other materials have a serious content for automobile batterie0 like cobalt, nickel, or iron. The sensitivity analysis of different lithium-based cathode materials showed only small changes in the environmental load. Hence, for a generic assessment it seems reasonable to neglect the diversity of many different active materials to reduce the complexity of battery chemistry. Li-ion battery in an Battery operated Electrical Vehicle does not lead to an over compensation of the further benefits of the higher efficiency of BEV compared to an ICEV.

Dahn et al Lithium ion based batteries for Improved battery systems have been developed. The improved battery systems consist of two additive mixtures in an electrolyte solvent that is a an organic solvent ,carbonate solvent , a non - aqueous sol vent , and methyl acetate . The the negative electrode of the improved battery system may be formed from natural or artificial graphite and positive electrode of the improved battery systems may be formed from lithium nickel manganese cobalt compounds.

SK. Dhar, S.R. Ovshinsky, P.R. Gifford Nickel or metal hydride batteries today represent fastest growing market segment for rechargeable batteries the higher energy and more environmentally chemistry offered by this nickel based technologies. In practical electrical vehicle including cars, vans, trucks, and other transport vehicles are operated by high energy density of nickel hybrid batteries coupled with high power density and long cycle life make this battery better chemistry a key operating technology in practice. Ovonic battery offer high power and energy with long life ,low self discharge , wide operating temperature range and fastest recharge.

Jiuyu Du1, Xinying Mo1, et al The short battery charging time exhibit by HPC High power charging is promising latest technology in battery operated vehicle and promotes temperature rise in the battery cell, safety risks involving battery usage, which should be managed with long range of battery. Various charging rates of different batteries have

upper State of charge boundaries at. Nonetheless, batteries charged at a constant rate of more than 2 C not be fully charged because polarization. At 4 C, the battery can only be charged to approximately 80% of State of charge. Mapping relationship between the charge rate and charge power. The thermal reaction of charged battery by various high rate. The temperature rising in full State of charge and partial State of charged range. The thermal model for estimating the heat generation and temperature rising. Set up the optimal charging boundary based the heat generation.

Conclusions

Electric car hybrid vehicle are definitely more environment friendly than internal combustion engine which use fossil fuel. Nowadays Batteries have long life and fast charging rate than older battery. Today research work prove a advanced technology of fuel cell and renewable source is very popular according to current green house effect and make the future look brighter for electric hybrid car. Battery-operated vehicles better than internal-combustion vehicles because which gives 100 times the energy of a battery by taking equal space. This density energy of extraordinary energy reduce the inherent disadvantage of the SI engine: wastage energy in combustion is 80% and only utilized 20% in to the wheels. Now days Lithium-ion battery technology and fuel cell technology has been gain attention to developing rapidly, especially Eco green vehicle , but costs become high. and the potential for dramatic reductions appears limited. Cost of electric vehicle is more due to battery cost and controller cost is very high so our Indian government provide some subsidy on purchasing electric vehicle.

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