

Fuel cell:-Future of energy source

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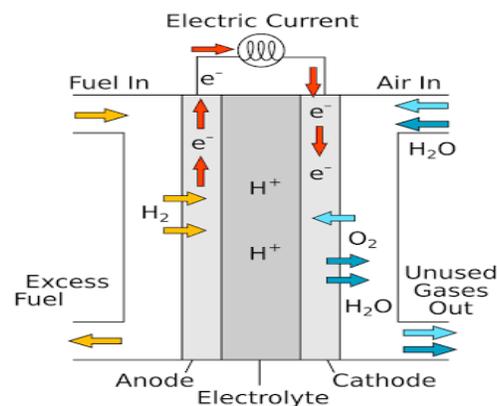
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Abstract

Fuel cell is alternative energy of future, when hydrogen and oxygen introduce in fuel cell, hydrogen at anode then it loose a(e^-) and H^+ reach at cathode passes through electrolyte, e^- come back at cathode passes through electrical circuit and here both are react with O_2 and make exhaust water and heat, it efficiency is better than any fossil fuel, in this review paper we will also discuss about different type of fuel cell, how it work, application of fuel cell and most important things what is challenges at present day and also in future. Due to some challenges in hydrogen a another type of fuel cell developed direct methanol fuel cell (DMFC), the opportunities and challenges has been reviewed in the present study.

Introduction

Fuel cell is an arrangement of electrodes or (device), that convert chemical energy into electrical energy and also produce steady supply of electricity. It is developed by William Grove, a Chemist, physicist and lawyer in 1839. He made a platinum catalyst and react hydrogen and oxygen over it and produce electricity. It means, Basically fuel cell works on two things Hydrogen and oxygen. When these gases are introduce in the fuel cell then they react with each other and generate electricity, heat and water. This is very ecofriendly because it exhausts only water after the reaction between hydrogen and oxygen.



Basic part of fuel cell

Anode :- It is a negative part of fuel cell which conduct the electrons (that is come out from hydrogen) to external circuit.

Cathode:- It is a positive part of fuel cell, it get back electrons from external circuit to the catalyst and recombine with hydrogen ions and oxygen to form water.

Electrolytes:- it is a type of proton exchange membrane and block electrons.

Catalyst:- it is a special type of material that make easy reaction between oxygen and hydrogen.

Types of fuel cell

- Alkaline Fuel cell (AFC)
- Phosphoric Acid Fuel cell (PAFC)
- Molten Carbonate Fuel cell (MCFC)
- Solid Oxide Fuel cell (SOFC)
- Proton Exchange Membrane Fuel cell (PEMFC)
- All of them have different properties
- PEMFC has highest potential for prevalent use.
- AFC has the highest efficiency.

MCFC and SOFC are specially designed to be used in power stationary to generate electricity in large scale.

Except all there is also a new type of fuel cell Direct Methanol Fuel Cell (DMFC). Its working mechanism is same as PEMFC but it has no need to use pure hydrogen, at the place of hydrogen we can also use methanol directly as basic fuel. It is also easy to transport but efficiency is quit lower than PEMFC.

Application of fuel cell

It has wide range of application because it has good quality like clean energy source, have high efficiency, noiseless electricity production process, reliable, easily maintainable, durable and light weight in comparison to IC Engine and Lithium ion batter

Automobile

Aero Space

Submarines

Portable power system

Boats

Challenges of fuel cell

It is quite expensive because material used in it such as platinum, hydrogen, transportation.

It is not safe as much as it should because hydrogen is highly flammable than other fossil fuel like coal, petrol.

Infrastructure of fuel cell means it based on hydrogen basically therefor infrastructure of production, distribution, and storing.

Non-Technical Barriers

Innovative Technical Development

Other Issues: Government Regulation, Insurance, etc.

Future of fuel cell

Future of fuel cell is very bright in automotive industry and also other field like space, industries and submarine due it incredible feature like zero pollution, fast refill hydrogen in hydrogen tank, light weight etc.

Presently in automotive industry 'Toyota' planned to make hydrogen-powered car at the same retail price as a hybrid, starting early 2020s, and also another automotive company working on fuel cell installation in vehicle like Honda (Honda clarity), Hyundai(Hyundai ix35 FCEV), Mercedes-Benz F cell.

Conclusion

Fuel cell, a way of producing electricity in future at wide-ranging or also we can say another source of energy due to highly efficient with compare to other fossil fuel also zero exhaust means pollution free, after the reaction of hydrogen and oxygen within fuel cell only pure water and heat release as exhaust. It has wide range of application like aerospace, automobile, industries etc. But in present day production of fuel cell is very challenging for us because hydrogen is very flammable gas that's why it can't exist alone due to these properties of hydrogen its storage is very difficult, cost of production of hydrogen is quite expensive, platinum coated catalyst is also expensive due to lack of platinum. So we have to make more research on fuel cell to reduce its cost, make easy to store hydrogen or other material or gas used at the place of hydrogen. On the basis of high rate of growth of pollution and at the same time high rate requirement of electricity energy **fuel cell may be future.**

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