

HYDROELECTRIC CELL

IDEA /SOLUTION

Implementation of **Hydroelectric Cell (HEC)** chemically for producing electricity from water.

- Cell works on water splitting process without acidic, basic medium.
- A BiFe_2O_3 is made from a fixed ratio of different chemicals by undergoing a series of processes.
- BiFe_2O_3 is used to create oxygen vacancies that help in splitting water and the electricity is conducted through Zinc or Silver electrodes
- Byproducts are also expensive as they are H_2 gas and nanoparticle's Zn(OH)_2 .

Problem Resolution

- Replace non-renewable energy sources
- Can also replace solar and wind energy.
- Prevent release of harmful gases to environment.
- Fuel cost is extremely less and very accessible as it is water.

UNIQUE VALUE PROPOSITION(UVP)

- Electricity from water splitting.
- No external voltage is required.
- Good Return in term of electricity, hydrogen gas and Zn(OH)_2 .

TECHNICAL APPROACH

FLOW CHART

MATERIAL DEVELOPMENT

- Takes precise ratio of different chemical compounds.
- ### Analysis
- Structural Characterization, Morphology Analysis, Surface Area and Porosity, Electron Paramagnetic Resonance (EPR), X-ray Photoelectron Spectroscopy (XPS).

Cell Assembling

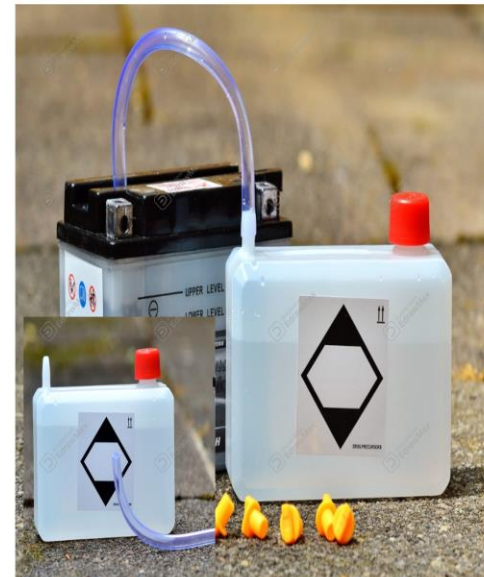
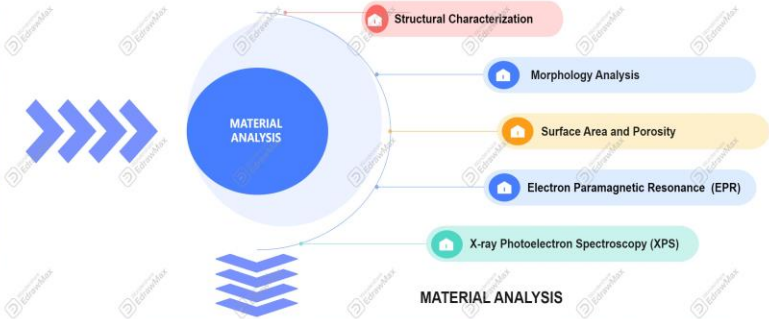
- Suitable electrode is used.
- Optimum surface area ratio of material sheet.

Cell Body

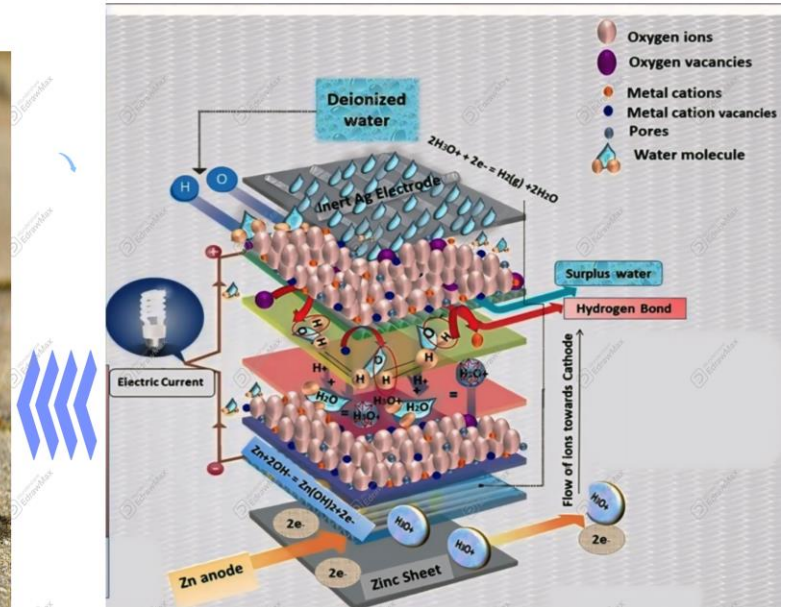
- Thermally Insulated body material.
- Proper intake hole for water and output hole for hydrogen gas.



CHEMICAL COMPOUNDS



BATTERY ASSEMBLY



CELL WORKING PROCESS

Image taken from Ref 4

FEASIBILITY AND VIABILITY

Analysis of the feasibility of the idea

At the factory level, creating a hydroelectric cell becomes more easier due to the larger infrastructure, which allows for convenient collection of oxygen gases.

Potential challenges and risks

No such potential risk is present.

Flammable gas are produced.

Strategies for overcoming these challenges

Increase surface area, increase oxygen vacancies and connect small parts of the sample in series.

Use of materials having high thermal resistance outside of cell.

IMPACT AND BENEFITS

- No harmful gases are released to environment.
- No ozone depletion and global warming.
- No external power required.
- No cell body structure limitations.
- High return of money as its byproducts are nanoparticles Zn(OH)_2 and Oxygen gasses.
- Overall Pocket Friendly.

RESEARCH AND REFERENCES

REFERENCES

1. Das, Rojaleena, Jyoti Shah, Sanjeev Sharma, Pritam Babu Sharma, and Ravinder Kumar Kotnala. "Electricity generation by splitting of water from hydroelectric cell: an alternative to solar cell and fuel cell." *International Journal of Energy Research* 44, no. 14 (2020): 11111-11134.
2. Kotnala, R. K., Rekha Gupta, Abha Shukla, Shipra Jain, Anurag Gaur, and Jyoti Shah. "Metal oxide based hydroelectric cell for electricity generation by water molecule dissociation without electrolyte/acid." *The Journal of Physical Chemistry C* 122, no. 33 (2018): 18841-18849.
3. Gaur, Anurag, Anurag Kumar, Purushottam Kumar, Rekha Agrawal, Jyoti Shah, and Ravinder K. Kotnala. "Fabrication of a SnO₂-based hydroelectric cell for green energy production." *ACS omega* 5, no. 18 (2020): 10240-10246.
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