



# **SNS COLLEGE OF TECHNOLOGY**

**(An Autonomous Institution)**

**COIMBATORE-35.**



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

## **DEPARTMENT OF AUTOMOBILE ENGINEERING**

**COURSE NAME : 19AUT202 - HYBRID ELECTRIC & FUEL CELL VEHICLE**

**II YEAR /III SEMESTER**

**Unit 4- Introduction to Fuel Cells**

**Topic : Molten Carbonate Fuel Cell**



# INTRODUCTION



- Molten-carbonate fuel cells **are high-temperature** fuel cells that operate at temperatures of 600 °C and above.
- Molten carbonate fuel cells are currently being developed for **natural gas and coal-based power plants** for electrical utility, industrial, and military applications.

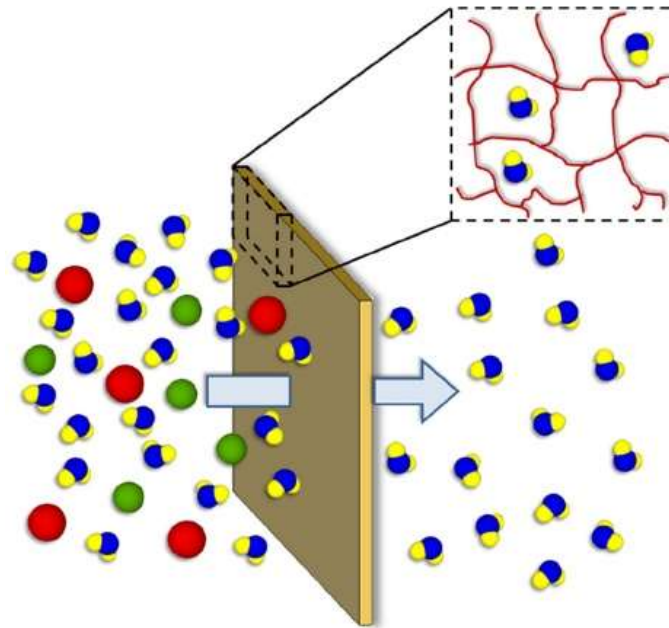




# SPECIFICATIONS



- **Fuel** - Hydrogen
- **Oxidant** - Oxygen
- **Catalyst** – Nickel
- **Electrolyte** – Alkali (Li, Na, and K) carbonates stabilized in an  $\text{LiAlO}_2$  ceramic matrix

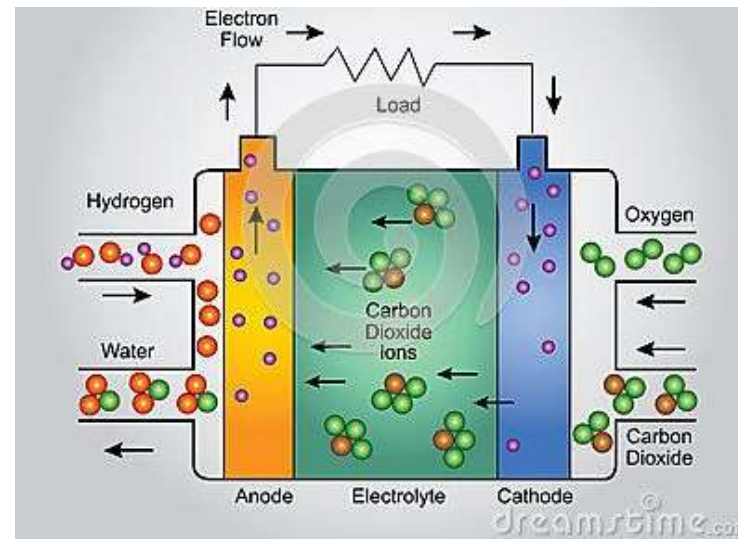




# CONSTRUCTION



- MCFC's use a **liquid electrolyte** (molten carbonate) which consists of a sodium (Na) and potassium (K) carbonate.
- This electrolyte is supported by a ceramic ( $\text{LiAlO}_2$ ) matrix to contain the liquid between the electrodes.
- Common MCFC electrolytes contain 62%  $\text{Li}_2\text{CO}_3$  and 38%  $\text{K}_2\text{CO}_3$ .

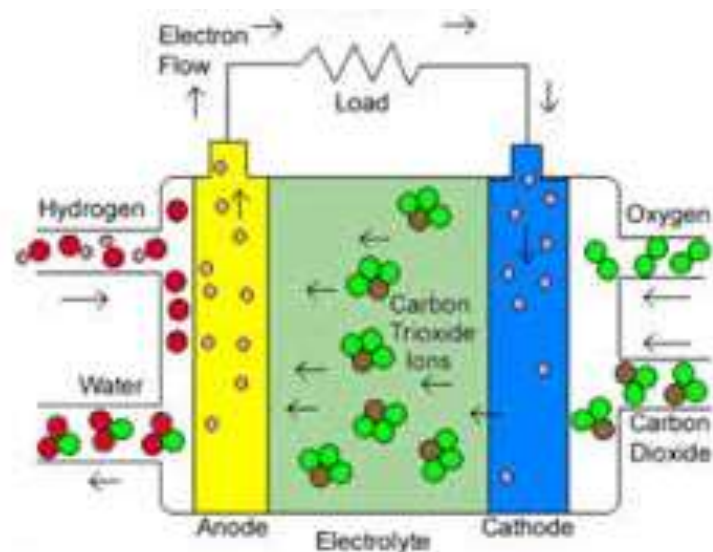




# CONSTRUCTION

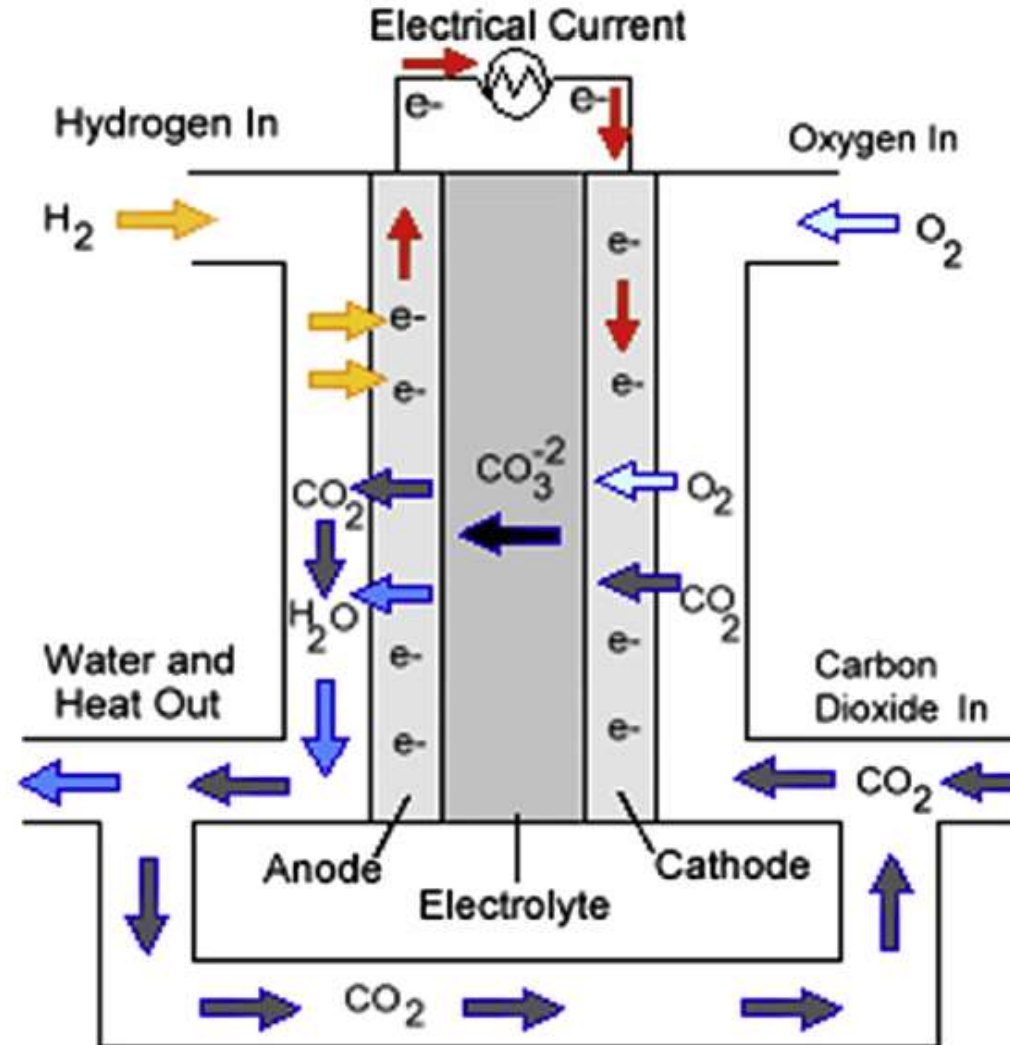


- The anode material typically consists of a **porous Ni based alloy**.
- Ni is alloyed with either Chromium or Aluminum in the 2-10% range.
- On the other side of the cell, the cathode material is composed of either **Lithium metatitanate** or of a **porous Ni** that is converted to a lithiated nickel oxide.





# FUEL CELL WORKING

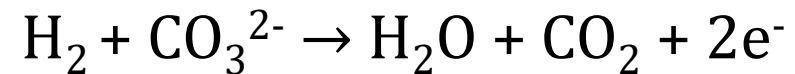




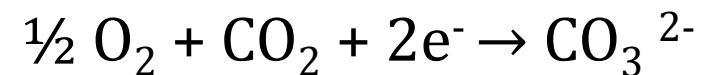
# CHEMICAL REACTION



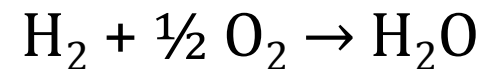
➤ **Anode Reaction:**



➤ **Cathode Reaction:**



➤ **Overall Reaction:**







# APPLICATIONS



- Used in Large stationary Power generation







## REFERENCE



- <https://www.sciencedirect.com/topics/engineering/molten-carbonate-fuel-cell>
- [https://en.wikipedia.org/wiki/Molten\\_carbonate\\_fuel\\_cell](https://en.wikipedia.org/wiki/Molten_carbonate_fuel_cell)



**THANK YOU !!!**